

US Army Corps
of Engineers
Baltimore District

CONSTRUCTION SPECIFICATIONS

FIRE STATION EXPANSION AND RENOVATION

**FORT DETRICK
MARYLAND**

REQUEST FOR PROPOSAL **DACA31-03-M-0003**

CONTRACT NO.

DATE **JUNE 02, 2003**

PROJECT TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

01000 ADMINISTRATIVE REQUIREMENTS
01011 DESIGN CRITERIA
01012 DESIGN AFTER AWARD
01050 JOB CONDITIONS
01060 SAFETY
01200 WARRANTY REQUIREMENT
01312 QUALITY CONTROL SYSTEM (QCS)
01320 PROJECT SCHEDULE FOR DESIGN BUILD
01330 SUBMITTAL PROCEDURES FOR DESIGN BUILD
01420 SOURCES FOR REFERENCE PUBLICATIONS
01459 CONTRACTOR QUALITY CONTROL - DESIGN BUILD CONSTRUCTION
01510 TEMPORARY CONSTRUCTION ITEMS
01561 ENVIRONMENTAL PROTECTION
01720 AS-BUILT DRAWINGS - CADD

DIVISION 02 - SITE WORK

02510 WATER DISTRIBUTION SYSTEM

-- End of Project Table of Contents --

SECTION 01000

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES FOR DESIGN BUILD:

SD-01 Preconstruction Submittals

Vehicle Registration; G.

Title Evidence.

Proof of purchase for equipment and/or materials.

Invoice Copies.

Proof of rental equipment costs.

Payment Evidence.

Proof of full payment.

Photographs.

SD-03 Product Data.

Cost or Pricing Data.

Proof of actual equipment costs.

Equipment Data.

An itemized list of serial/model numbers and equipment installed by the Contractor under this contract.

SD-10 Operations and Maintenance Data

O and M Data.

A list of proposed maintenance and instruction manuals that is mainly used for but not limited to customized equipment.

Commissioning Activity for HVAC; G.

The Contractor shall provide a separate activity for commissioning. Commissioning shall start only after all HVAC related work has been completed and all HVAC O&M manuals have been submitted and approved by the Government.

1.2 PROGRESS SCHEDULING AND REPORTING (DEC 1998)

1.2.1 Practicable Progress Schedule

The Contractor shall, within 20 days after date of commencement of work or as otherwise determined by the Contracting Officer, submit for approval a practicable progress schedule in accordance with specification Section 01320 PROJECT SCHEDULE FOR DESIGN BUILD showing the manner in which he intends to prosecute the work.

1.2.2 Software Package

The Contractor shall utilize an industry recognized scheduling software package to implement the requirements of Section 01320 PROJECT SCHEDULE FOR DESIGN BUILD. The program and data must be IBM PC compatible in a Window environment. These requirements are not intended to restrict the Contractors selection of an automated scheduling system but to establish a format which will allow use of the same program with government computers and automated information systems. The Contractor will provide at least one program installation and maintenance on government hardware complete with all program and data files. Such installation shall be maintained for the duration of the project until fiscal completion and shall allow analysis and of the project schedule by government personnel or agents.

1.2.3 Additional Scheduling Requirements

The Contractor shall incorporate the following requirements in addition to those specified in Section 01320 PROJECT SCHEDULE FOR DESIGN BUILD.

1.2.4 Preparation of Operation and Maintenance (O&M) Manuals

The Contractor shall provide a separate activity for the preparation and submission of all O&M manuals. The associated cost of \$3000 shall be assessed for this activity.

1.2.5 Commissioning Activity for HVAC

The Contractor shall provide a separate activity for commissioning of the HVAC system. The activity shall be as a minimum ____ days long. The associated cost shall be \$_____ of value of the HVAC system. Commissioning shall start only after all HVAC related work has been completed and all HVAC O&M manuals have been submitted and approved by the Government.

1.2.6 Additional Commissioning Requirements

Provide separate activities for commissioning of systems shown below. Each

Fire Station Expansion and Renovation
Fort Detrick, Maryland

activity shall be as a minimum duration as shown below and shall have an appropriate associated cost.

- a. Electrical Interior 30 days in Duration \$_____ Cost
- b. Electrical Exterior 30 days in Duration \$_____ Cost
- c. Fire Alarm System 30days in Duration \$_____ Cost
- d. Paging System 30days in Duration \$_____ Cost
- e. Communication System 30days in Duration \$_____ Cost

1.3 PAYMENTS TO CONTRACTORS (NOV 1976)

For payment purposes only, an allowance will be made by the Contracting Officer of 100 percent of the invoiced cost of materials or equipment delivered to the site but not incorporated into the construction, pursuant to the Contract Clause entitled "PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS". The Contracting Officer may also, at his discretion, take into consideration the cost of materials or equipment stored at locations other than the jobsite, when making progress payments under the contract. In order to be eligible for payment, the Contractor must provide satisfactory evidence that he has acquired title to such material or equipment, and that it will be utilized on the work covered by this contract. Further, all items must be properly stored and protected. Earnings will be computed using 100% of invoiced value. (CENAB-CO-E)

1.4 IDENTIFICATION OF EMPLOYEES (OCT 1983)

Each employee assigned to this project by the Contractor and subcontractors shall be required to display at all times, while on the project site, an approved form of identification provided by the Contractor, as an authorized employee of the Contractor/subcontractor. In addition, on those projects where identification is prescribed and furnished by the Government, it shall be displayed as required and it shall immediately be returned to the Contracting Officer for cancellation upon release of the assigned employee and or completion of project. (CENAB)

1.5 PURCHASE ORDER (SEP 1975)

One readable copy of all purchase orders for material and equipment, showing firm names and addresses, and all shipping bills, or memoranda of shipment received regarding such material and equipment, shall be furnished to the appointed Contracting Officer's Representative as soon as issued. Such orders, shipping bills or memoranda shall be so worded or marked that all material and each item, piece or member of equipment can be definitely identified on the drawings. Where a priority rating is assigned to a contract, this rating, the required delivery date, and the scheduled shipping date shall also be shown on the purchase order. At the option of the Contractor, the copy of the purchase order may or may not indicate the purchase price. (CENAB-CO-E)

1.6 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE (EFARS 52.0231.5000

(OCT 1995))

(a) This clause does not apply to terminations. See 52.249-5000, Basis for settlement of proposals and FAR Part 49.

(b) Allowable cost for construction and marine plant and equipment in sound workable conditions owned or controlled and furnished by a contractor or subcontractor at any tier shall be based on actual costs data for each piece of equipment or groups of similar serial and services for which the government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs can not be determined for any piece of equipment or groups of similar serial or series equipment from the contractor's accounting records, costs for that equipment shall be based upon the applicable provisions of EP1110-1-8 Construction Equipment Ownership and Operating Expenses Schedule, Region East. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the contracting officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retroactive pricing, the schedule in effect at the time the work was performed shall apply.

(c) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d) (ii) and Far 31.205-36. Rates for equipment rented from an organization under common control, lease-purchase arrangements, and sale-leaseback arrangements, will be determined using the schedule, except that actual rates will be used for equipment leased from an organization under common control that has an established proactive of leasing the same or similar equipment to unaffiliated leasees.

(d) When actual equipment costs are proposed and the total amount of the pricing action exceeds the small purchase threshold, the contracting officer shall request the contractor to submit either certified cost or pricing data, or partial/limited data, as appropriate. The data shall be submitted on Standard Form 1411, Contract Pricing Proposal Cover Sheet. CENAB-CT/SEP 95 (EFARS 52.231-5000)

1.7 REAL PROPERTY EQUIPMENT DATA (APR 1975)

At or before the time of completion of the contract, the Contractor shall submit to the Contracting Officer a complete itemized list, including serial and model number where applicable, showing the unit retail value of each Contractor furnished item of mechanical, electrical and plumbing equipment installed by the Contractor under this contract. For each of the items which is specified herein to be guaranteed for a specified period from the date of acceptance thereof, either for beneficial use or final acceptance, whichever is earlier, against defective materials, design, and workmanship, the following information shall be given: the name, address and telephone number of the Subcontractor, Equipment Supplier, or Manufacturer originating the guaranteed item. The list shall be accompanied by a copy of the specific guarantee document for each item which is specified herein to be guaranteed if one had been furnished to the

Fire Station Expansion and Renovation
Fort Detrick, Maryland

Contractor by the Equipment Supplier or Manufacturer. The Contractor's guarantee to the Government of these items will not be limited by the terms of any manufacturer's guarantee to the Contractor. Baltimore District NADB Form 1019 may be utilized for the itemized listing and will be made available to the Contractor upon request. (CENAB-CO-E)

1.8 O and M DATA (JUL 1979)

The requirements for furnishing operating and maintenance data and field instruction are specified elsewhere in the specifications. The Contractor shall submit to the Contracting Officer, at a time prior to the 50% project completion time, a list of proposed maintenance and instruction manuals to be furnished the Government and the scheduled dates of all required field instructions to be provided by Contractor furnished personnel or manufacturer's representatives. All maintenance and instruction manuals must be furnished to the Contracting Officer at least 2 weeks prior to the scheduled dates of any required Contractor furnished field instructions or at least one month prior to project completion if no Contractor furnished field instructions are required. (CENAB)

1.9 FACILITY SECURITY REQUIREMENTS

a. Paragraph CONTRACTOR'S ACCESS is a basic plan for the Contractor. If additional information is needed, the POC is _____.

b. Paragraphs LIMITED ACCESS CONTROL; 24-HOUR ACCESS CONTROL and VEHICLE REGISTRATION: If additional information is needed the POC is _____.

1.9.1 Contractor's Access

a. Contract Work

1. The Contracting Officer will provide a contractor list to the Provost Marshal's Office.
2. The Contractor will then provide a list of his subcontractors to the PMO.
3. The Contractor and subcontractors will then provide a proposed list of their personnel. Each employee shall be required to obtain a temporary 30 day pass if they anticipate working on the contract for more than 1 day.
4. Deliveries will need a bill of lading indicating the Contractor's name and which contract they are delivering to.

b. Contractor's Meeting With Government Personnel on Fort Detrick.

1. Government employees will most likely be using GSA vehicles.
2. Contractors will be required to register at the Visitor's Center located at _____.

1.9.2 Limited Access Control

a. Limited access control involves gates either permanently closed or manned by military police or security personnel.

1.

b. Three gates with limited access Monday thru Friday and on weekends and holidays are as follows:

1. Old Farm:

Inbound: 0600-1800 M-F (closed on holidays), Outbound: 0600-1830 M-F (closed on holidays)

2. Opposumtown:

Inbound: 0600-1800 M-F (closed on holidays), Outbound: 1100-1800 M-F (closed on holidays). During the two way traffic (1100-1800), outbound traffic from post must yield to the oncoming, inbound traffic in maneuvering the barricades.

3. Rosemont Ave:

Outbound: 1500-1600 M-F

The Rosemont Ave gate (closed for traffic after Sept. 11, 2001) will be open for exit only from 1500 to 1800. The gate will be closed during all other hours. No one will enter through this gate.

1.9.3 24-Hour Access Control

a. The following gate has 24-hour access seven days a week.

a. Main Gate:

(inbound and outbound)

Beginning Tuesday, 10 Dec., all non-decaled vehicles will enter through the entrance immediately to the right of the main gate on Seventh Street, Monday through Friday, from 0600-1800. At all other times, non-decaled vehicles will enter through the main gate. All decaled vehicles continue to enter through the two lanes at the main gate. This change will decrease the amount of time vehicles wait in line on Seventh Street to enter through the main gate.

b. Everyone who lives or works on Fort Detrick must register their vehicles. Only registered vehicles will be allowed to enter. Vehicles that are not registered with the installation Provost Marshall Office will be denied access.

1.9.4 Vehicle Registration

a. Provide identification showing government affiliation.

b. Provide a valid driver's license, vehicle registration and proof of insurance.

- c. If someone else owns the vehicle, the owner must authorize the registration with either a power of attorney or a notarized letter.

1.10 NEGOTIATED MODIFICATIONS (OCT 84)

Whenever profit is negotiated as an element of price for any modification to this contract with either prime or subcontractor, a reasonable profit shall be negotiated or determined by using the OCE Weighted Guidelines method outlined in EFARS 15.902. (Sugg. NAB 84-232)

1.11 PHOTOGRAPHS

PHOTOGRAPHIC COVERAGE: (SEP 85) Permission to take photographs under this contract shall be obtained from the Provost Marshal through the Contracting Officer. The Contractor shall provide photographic coverage under the contract. These services shall be for ten commercial grade color photographs every three months from the beginning of the contract until acceptance of the completed work. These photographs shall be in 8" x 10" size and shall be taken at intervals and at the place designated by the Contracting Officer. Negatives from all of the above photographs shall be given to and become the property of the Government. (CENAB-CO)

1.12 PARTNERING (NOV 92)

In order to most effectively accomplish this contract, the Government is willing to form a cohesive partnership with the Contractor and its subcontractors. This partnership would strive to draw on the strengths of each organization in an effort to achieve a quality project done right the first time, within budget and on schedule. This partnership would be bilateral in make-up and participation will be totally voluntary. Any cost associated with effectuating this partnership will be agreed to by both parties and will be shared equally with no change in contract price. (CENAB-EN-DT)

1.13 PERMITS

The permits listed below shall be obtained by the Contractor. After final approvals by the respective state agencies are received, the Contractor will furnish approval letters and permits to the Contracting Officer before the start of construction. The Contractor shall abide by all permit requirements.

- a. Erosion and Sedimentation (E&S) Control Plan: The Contractor shall design and obtain approval for an Erosion and Sediment control plan in accordance with the Maryland Department of the Environment (MDE) Standards and Specifications for Soil Erosion and Sediment Control Manual.
- b. Stormwater Management (SWM) Plan: The Contractor shall obtain a Stormwater Management permit from the Maryland Department of the Environment prior to construction. Refer to Section 1011 DESIGN CRITERIA, paragraph 2.9.2 "Stormwater Management" for details.

Fire Station Expansion and Renovation
Fort Detrick, Maryland

- c. NPDES permit: The project will require coverage under the State of Maryland's Stormwater General Permit for Construction Activities. The Contractor shall be responsible for compliance with State of Maryland's National Pollution Discharge Elimination System (NPDES) permit requirements for storm water discharges from construction sites and will need to apply for and obtain all associated permits.
- d. Water/Sewerage Construction Permit: The Contractor shall coordinate with MDE and obtain any necessary permits as required.
- e. Excavation Permit: The Contractor shall be responsible for obtaining an Excavation Permit from Fort Detrick DPW prior to construction. Methods/limits of excavation must be worked out with Ft. Detrick during this process; installation of utilities across Porter Street shall not disrupt traffic, which may necessitate the need for trenchless excavation methods.

Fort Detrick website URL is: <http://www.detrick.army.mil>

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

**SECTION 01011
DESIGN CRITERIA
TABLE OF CONTENTS**

CHAPTER 1. INTRODUCTION

PARAGRAPH	1.1	INTRODUCTION AND GENERAL DESIGN REQUIREMENTS
	1.2	AUTHORIZATION
	1.3	GENERAL DESIGN REQUIREMENTS

CHAPTER 2. CIVIL DESIGN AND SITE DEVELOPMENT

PARAGRAPH	2.1	DESCRIPTION
	2.2	REFERENCE REQUIREMENTS AND STANDARDS
	2.3	SURVEY
	2.4	STAGING, CONTRACTOR ACCESS, TEMPORARY FACILITIES AND SECURE AREA
	2.5	DEMOLITION
	2.6	ANTITERRORISM/FORCE PROTECTION REQUIREMENTS
	2.7	NEW CONSTRUCTION
	2.8	GRADING
	2.9	STORM DRAINAGE
	2.10	WATER SYSTEM
	2.11	SANITARY SEWER SYSTEM
	2.12	GAS LINES
	2.13	PERMITS

Attachment 2-1	Conceptual Site Plan
Attachment 2-2	Reference Drawing-Utility Site Plan
Attachment 2-3	Reference Drawing-Layout Plan
Attachment 2-4	Reference Drawing-Layout Plan

CHAPTER 3. FOUNDATION AND GEOTECHNICAL DESIGN

PARAGRAPH	3.1	DESCRIPTION
	3.2	REQUIREMENTS
	3.3	DESIGN ANALYSIS
	3.4	SPECIFICATIONS
	3.5	COMPLIANCE VERIFICATION
SECTION	I	PROJ LOCATION & INTENT OF GEOTECHNICAL DATA/REQUIREMENTS
	II	SUBSURFACE CONDITIONS & EXPLORATION
	III	EARTHWORK
	IV	PAVEMENT DESIGN
	V	FOUNDATION DESIGN

Attachment 1	Location Plan
Attachment 2	Subsurface Exploration Plan
Attachment 3	Boring Log Notes
Attachment 4	Boring Logs
Attachment 5	Apparatus Information
Attachment 6	Flexible Pavement Design Document
Attachment 7	Rigid Pavement Design Document (non-reinforced)
Attachment 8	Rigid Pavement Design Document (interior floor slabs)
Attachment 9	Subdrain Sequence of Installation
Attachment 10	Pavement Edge Subdrain Details

CHAPTER 4. LANDSCAPE

PARAGRAPH	4.1	GENERAL
	4.2	LOCATION AND SETTING
	4.3	PLANTING DESIGN
	4.4	TREES
	4.5	TREE PLANTING
	4.6	SHRUBS
	4.7	GRASSING (SEEDING AND SODDING)
	4.8	GRASSING (SEEDING AND SODDING) SPECIFICATIONS
	4.9	TOPSOIL
	4.10	TREE PROTECTION
	4.11	SITE FURNITURE
	4.12	EXTERIOR BUILDING NAME SIGNS

CHAPTER 5. ARCHITECTURAL

PARAGRAPH	5.1	GENERAL
	5.2	REFERENCES
	5.3	BUILDING AREAS
	5.4	INTERIOR BUILDING SPACE
	5.5	GENERAL REQUIREMENTS
	5.6	BUILDING SHELL
	5.7	INTERIOR CONSTRUCTION
	5.8	INTERIOR FINISHES
	5.9	INTERIOR COLORS
	5.10	PROCUREMENT

Attachment 1 Conceptual Floor Plan

CHAPTER 6. STRUCTURAL

PARAGRAPH	6.1	STRUCTURAL CRITERIA
	6.2	DESIGN CRITERIA
	6.3	DESIGN LOAD CRITERIA
	6.4	FOUNDATIONS
	6.5	SEISMIC DESIGN
	6.6	LATERAL RESISTANCE
	6.7	FORCE PROTECTION
	6.8	SELECTION OF STRUCTURAL SYSTEM
	6.9	GENERAL DESIGN CRITERIA
	6.10	CONCRETE DESIGN
	6.11	MASONRY DESIGN
	6.12	STRUCTURAL STEEL DESIGN
	6.13	LIGHT GAGE STEEL FRAMING TRUSSES

CHAPTER 7. HVAC

PARAGRAPH	7.1	GENERAL REQUIREMENTS
	7.2	DESIGN CRITERIA
	7.3	SOURCE OF HEATING AND COOLING
	7.4	OCCUPANCY
	7.5	ANTITERRORISM AND SECURITY MEASURES
	7.6	TESTING, ADJUSTING, AND BALANCING (TAB)
	7.7	COMMISSIONING
	7.8	SEISMIC

- 7.9 ROOM SYSTEMS
- 7.10 EQUIPMENT AND MATERIALS
- 7.11 OPERATION AND MAINTENANCE (O&M) MANUALS

CHAPTER 8. PLUMBING

- PARAGRAPH 8.1 GENERAL REQUIREMENTS
- 8.2 PLUMBING FIXTURES AND EQUIPMENT
- 8.3 PIPING (NOT INCLUDING GAS PIPING)
- 8.4 GAS PIPING
- 8.5 INSULATION

CHAPTER 9. FIRE PROTECTION

- PARAGRAPH 9.1 CODES, PRODUCTS, AND INSTALLATION STANDARDS
- 9.2 ADDRESSABLE FIRE ALARM SYSTEM
- 9.3 FIRE SUPPRESSION SYSTEM
- 9.4 TESTING

CHAPTER 10. ELECTRICAL

- PARAGRAPH 10.1 GENERAL REQUIREMENTS
- 10.2 POWER AND LIGHTING REQUIREMENTS
- 10.3 DATA/COMMUNICATIONS
- 10.4 INTRUSION DETECTION SYSTEM
- 10.5 INTERIOR CABLE TELEVISION
- 10.6 PUBLIC ADDRESS (pa) SYSTEM
- 10.7 CABLE TRAY
- 10.8 GROUNDING
- 10.9 FIRE ALARM SYSTEM
- 10.10 PARKING LOT ACCESS

APPENDIX A FORT DETRICK INSTALLATION DESIGN GUIDELINES

CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

1.1 Introduction and General Design Requirements

1.1.1 The project objective is to modify and provide a new apparatus bay addition to the existing fire station facility for the Fire and Emergency Services Facility at Fort Detrick, Maryland. The proposed site is located on the south side of Porter Street, near the main entry gate. The Renovated Fire Station Facility will consist of a watch alarm room, administrative offices, kitchen and dining area, day room, bunk room area, bathroom/shower facilities for male and female fire personnel, work room and storage room (with mezzanine above) and second floor training room adjacent to existing physical fitness room. Construction of a new five-bay, drive-through apparatus room as an addition to an existing one-company fire station. Associated supporting facilities will include parking areas, asphalt pavement, sidewalks, water, sewer, gas, electrical service, fire protection and alarm systems, access roads, storm drainage, erosion control measures, information systems, equipment, and landscaping. Access for the handicapped shall be provided to all public areas. An energy monitoring and control system shall be provided. Heating and Air Conditioning shall be provided by the existing system in the renovated areas. Heating shall be provided in the apparatus bays.

1.1.2 The Fire and Emergency Service is an organization consisting of approximately 24 fire personnel (12 per shift) with providing HAZMAT response and rescue support for Fort Detrick as well as Frederick County. Currently the Fort Detrick one-company Fire Station and the Provost Marshal's Office and Police Station share Building 1504. By having a two-company fire station and separate defined Provost Marshal Office, this will ensure that the police and fire personnel have proper organized facilities to meet their requirements.

1.1.2.1 The Fire Station and Provost Marshal's Office normal hours of operation are 24 hours a day, seven days a week, 365 days a year. Facility will remain operational at all times. Visitors/customers will be received at this facility on a limited basis. At certain times, training classes or meetings will be conducted and anticipated personnel load may increase by 50 percent.

1.2 Authorization

1.2.1 Department of Defence, DD Form 1391 for the subject project dated 22 January 2001, revised 26 March 2002. Project Number 55838.

1.3 General Design Requirements

1.3.1 The project shall be designed and constructed in accordance with the criteria contained herein and using industry standard materials and efficient practices. The building design and materials selected shall be energy efficient, durable, and easily maintained. Complete design shall conform and be coordinated with the Installation Design Guide (IDG) initiatives of the Deputy Commander. The Contractor shall be responsible for the professional quality, technical accuracy and coordination of all designs, drawings, specifications and other documents or publications upon which construction is based.

1.3.2 The design and construction of the Fire Station Facility shall be compatible with the surrounding environment, and shall conform to the Fort Detrick Installation Design Guide.

1.3.3 All work, associated amenities, and site improvements required by the Contract shall be constructed within the project site.

1.3.4 The construction contractor shall obtain all air quality permits.

1.3.5 The design of architectural, interior, structural, mechanical, plumbing, fire protection, electrical, civil, landscape architectural and other engineering features of the work shall be accomplished, reviewed and approved by engineers, architects, and interior designers licensed to practice in their respective professional.

1.3.6 The Contractor shall check the design requirements for accuracy and applicability. The Contractor is responsible and liable for the complete design. The Contractor shall not assume the provided design requirements and design solicitation will alleviate him from performing any design.

1.3.7 The RFP documents provide site survey drawings in English units. Also, included is a site constraint drawing of the existing building and the new apparatus bay addition.

1.3.8 Design and construction of this facility shall comply with the minimum requirements of the Interim Anti-Terrorism/Force Protection Construction Standards (December 16, 1999) as identified in various technical requirements of this RFP. A risk and threat analysis was conducted in accordance with Army Pamphlet 190-51, (Risk Analysis for Army Property) for this facility and resulted in a rating of "MEDIUM". See below for a copy of the Risk and Threat Analysis. Design Basis Threat and Level of Protection: The proposed design provides the level of protection required for personal, personnel, classified, and building security.

1.3.9 Sustainable Design:

The contractor shall comply with and provide for the requirements of sustainable design with a minimum design target of "Bronze Spirit".

1.3.10 As-Built Drawings:

Contractor shall maintain mark-up "As-built" drawings available at the on site construction trailer. Also, provide in progress digitized as-built drawings to the DIS at least 3-4 times during the construction duration. Complete as-built drawings shall be furnished at the completion of the project.

CHAPTER 2

CIVIL DESIGN AND SITE DEVELOPMENT

2.0 CIVIL AND SITE DEVELOPMENT

2.1 Description

The site development consists of, but is not limited to, tree preservation, clearing and grubbing, grading for siting of new structure, construction of roads, drives, parking lots, curbs and gutters, pedestrian walks, storm drainage systems including storm water management structures, fencing, utilities, lighting, signage, landscaping, antiterrorism/force protection, and fire protection.

2.2 Reference Requirements and Standards:

The following codes and standards of the most current edition shall be used as standards for new construction and life safety design. Where there is a conflict between the Request For Proposal (RFP) and the building codes and standards, the most stringent shall apply. This list is not intended to be a complete list. All work shall be designed and constructed to meet all State and Federal codes, standards and laws. Refer to the technical specifications for other standards and references not listed below:

AASHTO, A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS, latest edition

ARMY TM-5-822-2/AIR FORCE AFM 88-7, General Provisions for Geometric Design for Roads, Streets, Walks, and Open Storage Areas, Department of the Army, and of the Air Force, July 1987

Accessibility Guidelines for Buildings and Facilities. Available from U.S. Architectural & Transportation Barriers Compliance Board, 1111 18th Street, NW, Suite 501, Washington, DC 20036-3894, (202) 653-7834 v/TDD or (202) 653-7863 FAX

AMERICANS WITH DISABILITIES ACT Accessibility Guidelines for Buildings and Facilities, Transportation Facilities, and Transportation Vehicles.

AWWA M17, INSTALLATION, FIELD TESTING, AND MAINTENANCE OF FIRE HYDRANTS, 1989, American Water Works Association

AWWA C500, METAL-SEALED GATE VALVES FOR WATER SUPPLY SERVICE, 1993, American Water Works Association

AWWA C502, Dry-Barrel Fire Hydrants, 1994, American Water Works Association

AWWA C651, DISINFECTING WATER MAINS, 1992, American Water Works Association

ANSI D6.1, Manual on Uniform Traffic Control Devices (MUTCD), Millenium Edition, dated December 2000

BOCA National Building Code, 1999, Building Officials and Code Administrators International

DEPARTMENT OF DEFENSE ANTITERRORISM/FORCE PROTECTION CONSTRUCTION STANDARDS, December 16, 1999, interim standards.

HEC-RAS, River Analysis System, U.S. Army Corps of Engineers Hydrologic Engineering Center, Sep 1998

INSTALLATION DESIGN GUIDELINES (IDG) FOR FORT DETRICK, latest edition, available from the Fort Detrick Directorate of Installation Services (DIS), Master Planning Section, (301) 619-2443.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL, Maryland Department of the Environment Water Management Administration, 1994

MARYLAND STORMWATER DESIGN MANUAL VOLUMES I & II (COMAR 26.17.02.01-1), Maryland Department of the Environment Water Management Administration, October 2, 2000

MARYLAND STORMWATER MANAGEMENT GUIDELINES FOR STATE AND FEDERAL PROJECTS, July 1, 2001

MARYLAND STORMWATER MANAGEMENT REGULATIONS (COMAR 26.17.02)

MARYLAND STATE HIGHWAY ADMINISTRATION BOOK OF STANDARDS, HIGHWAY AND INCIDENTAL STRUCTURES, 1999

MARYLAND STATE HIGHWAY ADMINISTRATION HIGHWAY DRAINAGE MANUAL, latest edition

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)- NFPA 24, INSTALLATION OF PRIVATE FIRE SERVICE MAINS AND THEIR APPURTENANCES, 1995

OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)

SpecsIntact Federal Government Contract Specifications - Software can be downloaded from: <http://si.ksc.nasa.gov/specsintact/software/software.com>

United Facilities Criteria (UFC), DOD Minimum Antiterrorism Standards for Buildings, UFC4-010-01, dated 31 July 2002

UNIFORM FEDERAL DISABILITY STANDARDS (UFDAS)-

UNIFORM FEDERAL GUIDE SPECIFICATIONS (UFGS)- Located online at: <http://www.ccb/ufgs/ufgstoc.htm>

2.3 SURVEY

Topographic and utility mapping of the site may be obtained from Eric Williams, Directorate of Installation Services (DIS) at (301) 619-2712.

2.4 STAGING AREA, CONTRACTOR ACCESS, TEMPORARY FACILITIES, SECURE AREA AND MEMORIAL SITE

2.4.1 Staging Area

The location of the Contractor staging area shall be contained within the site boundaries as shown on Attachment 2-1.

2.4.2 Contractor Access

For all truck traffic, access to the Fort shall be through the Old Farm Gate. Truck arrival and routing should be discussed with and arrival For automobiles, access to the Fort shall be through any of the gates. Access to the site shall be via Porter Street. For times of operations, refer to Section 01000 ADMINISTRATIVE REQUIREMENTS, Para 1.9.2. For access badges/passes for all Contractor personnel refer to Section 01000 ADMINISTRATIVE REQUIREMENTS, Para 1.9.1.

2.4.3 Temporary Facilities for Fire Station Personnel

Temporary facilities shall be provided by the Contractor. The facilities shall include appropriate office and living space for 12 fire personnel per shift for two shifts a day. The facilities shall also include appropriate shower, restroom, kitchen and sleeping facilities with separate shower, restroom and sleeping for male and female fire personnel. The facilities may be in the form of pre-fabricated modular units or mobile trailers. The facilities are to be located in the area shown on Attachment 2-1.

2.4.4 Temporary Structure for Fire fighting equipment

A temporary enclosed structure is to be provided to house the fire fighting equipment (six pieces of equipment) and it shall be located in the area shown on Attachment 2-1. The Contractor shall coordinate with the Fire station personnel and the Provost Marshall to determine the actual size needed and to ensure that other necessary operations are not hindered. Temporary fencing shall be placed around this area with a gate that allows entrance/exit by the equipment. Any temporary facilities for fire station personnel shall also be enclosed by the fencing.

2.4.5 Temporary Fence

The contractor shall construct a temporary chain link fence having a minimum height of eight (8)) feet around the temporary areas for fire station personnel and the fire fighting equipment. The fence shall be equipped with access gates that can be closed and padlocked.

2.4.6 Memorial Site

The existing memorial site shall remain and is to be protected during any demolition, construction or renovation required to complete the work.

2.5 DEMOLITION

Prior to any work being performed, the Contractor shall hire a locator company to locate all underground utilities. The Contractor shall mark out and record all locations of underground utilities after they are identified. The Contractor shall be responsible for protecting the utilities during the life of the project. There is a forced main, in particular, that passes between the Fire Station and Porter Street; any damage to this line would be very serious for the entire installation. The Contractor shall remove all pavement, abandoned utilities, trees, brush, debris and other features required to design and construct the new addition to the Fire Station. The existing mature and thriving trees, and recently planted trees on or adjacent to the site, shall remain and be incorporated into the design where

practical. If possible, trees can be relocated to other locations on the site rather than disposed of.

There are no existing buildings or structures on site to be demolished, however utility lines (including laterals and services), concrete or masonry manholes and utility boxes, or storm drain culverts could be encountered.

The existing utility lines are identified on Attachments 2-2, 2-3 and 2-4. All existing utilities shall be protected during any demolition, construction or renovation required to complete the work. The Contractor shall be liable for all damages should they occur.

Hazardous material or waste is not likely to be encountered at the site. The results of radon testing performed show that that no radon has been found at the Fort.

All debris and/or waste materials shall be disposed of outside the limits of Government controlled lands. Disposals shall be in accordance with the federal, state, and local regulations. The Contractor shall notify the Contracting Officer if any material to be disposed of is found to contain hazardous, toxic, biological, or radiological substances. Rubbish and debris shall be removed from Government property daily to avoid accumulation at the project site. Demolition shall be specified by the Contractor in the Uniform Federal Guide Specifications (UFGS) Section 02220 DEMOLITION.

2.6 ANTITERRORISM/FORCE PROTECTION REQUIREMENTS

The site shall be designed in accordance with DOD Minimum Antiterrorism Standards for Buildings, dated 31 July 2002. A copy of this document will be made available to the Contractor. Prospective bidders shall maintain a minimum thirty-three (33) foot setback between the building and any areas accessible by vehicles, including roads and proposed parking/drop off areas. Permanent objects, including mechanical equipment, landscaping, etc., greater than six (6) inches in height that could conceal a person or explosive device, should not be located within thirty-three (33) feet of the building. Dumpsters shall be kept a minimum of eighty-two (82) feet from the building. Final authority and approval of force protection requirements shall be coordinated with the Fort Detrick Plans and Operations at (301) 619-3312. **Also see Chapter 1 of this RFP for additional information concerning Antiterrorism/Force Protection requirements.**

2.7 NEW CONSTRUCTION

2.7.1 General Requirements and Site Layout

Site planning and landscape design for the facility shall be focused to meet the emphasis of the Fort Detrick Installation Design Guide (IDG) and any additional requirements (refer to Section 01011, Chapter **4.0** - LANDSCAPING for additional requirements). The finished project will consist of the optimum layout of all of the features required, including but not limited to the building, parking lots, access roads or driveways, drainage, storm water management systems, and utilities. Wetlands, a one-hundred (100) year floodplain, historic/cultural resources and unexploded ordinance are not known to occur on this site.

The Contractor shall locate the features for this project within the limits shown using Attachment 2-1, in accordance with the requirements/restrictions listed on them.

Access to the site shall be from Porter Street. Access to the rear of the building using a paved driveway is required for emergencies, maintenance and deliveries. Access via wide sidewalks/clear areas around facility shall meet minimum customer requirements.

Additional items of consideration in siting the project features will be force protection, aesthetics, optimum drainage, fire protection, environmental concerns, safety, and convenience for vehicles and pedestrians. Outside mechanical and electrical units, dumpsters, etc., shall be screened with suitable landscaping or walls as per the Fort Detrick Installation Design Guidelines (IDG). Any storm water detention basin(s) shall be located on the site to accept runoff from the entire project.

2.7.2 Open Turf Area

Open turf areas shall be designed in accordance with Chapter 4.0 - LANDSCAPING.

2.7.3 Parking and Access Drives

2.7.3.1 A total of 12 new parking spaces shall be provided in the area shown on Attachment 2-1. The parking areas and access drives shall be designed to meet traffic flow requirements and to provide convenient and safe access and circulation (including deliveries and fire protection) within the facility areas.

2.7.3.2 The parking lot configuration shall be in accordance with the IDG and parking spaces shall be 9.5' wide by 18' long. Parking lots and access roads shall be bituminous pavement except in front of dumpsters where concrete shall be used.

2.7.3.3 New driveways for general access to the facility shall be two-lane and have a minimum width of twenty-four (24) feet. The minimum turning radius for all new intersections shall be twenty-four (24) feet except where fire truck access is required. The turning radii/access widths for fire trucks shall be coordinated with the Post Fire Department at (301) 619-2163. The designer shall consider the types of vehicles traversing and parking at these facilities. Vehicles shall include but not be limited to the following: passenger cars, fire trucks, emergency vehicles, garbage trucks, delivery vehicles, and utility vehicles.

2.7.3.4 Traffic control signs and pavement markings shall be provided as necessary in accordance with the Manual of Uniform Traffic Control Devices. Striping of the parking lots is required and all stripes shall be white.

2.7.4 Restricted Access

The existing driveway or lane directly adjacent to the fire station and police station entrances shall be restricted to fire and police personnel only. This may be accomplished by using appropriate automatic entrance/exit controls. The Contractor shall coordinate with the users of the building with regards to an agreeable configuration that addresses entrance/exit

controls. If necessary, the existing driveway shall be widened to accommodate the appropriate traffic flow.

2.7.5 Sidewalks

2.7.5.1 Exterior sidewalks shall be constructed along parking lots and roads. Depressed curb(s) shall be provided for handicapped accessibility at all intersections of walks and drives. The minimum thickness of sidewalks shall be four (4) inches, and the minimum width shall be six (6) feet. Sidewalks located parallel to curbs shall be set back a minimum of two (2) feet from the curb.

2.7.5.2 The sidewalks shall be constructed of concrete with a minimum compressive strength of 3000 pounds per square inch (psi). Contraction joints shall be spaced at five (5) feet; expansion joints shall be constructed at maximum spacing of thirty (30) feet and at the intersection of walks and curbs.

2.7.6 Curb and Gutter

Streets shall be provided with combination concrete curb and gutter. Curbs shall be depressed at entrances to driveways with gradients providing positive drainage. Depressed curbs shall also be provided as necessary for pavement drainage. Rolled combination curb and gutters are not permitted.

2.7.7 Pavement

The pavement design analysis shall meet the requirements specified in Section 01011, Chapter **3.0** - FOUNDATION AND GEOTECHNICAL DESIGN.

2.7.8 Street and Building Signs

Street and traffic control signs shall conform to the Manual of Uniform Traffic Control Devices. Non-traffic control signs as well as building signs shall conform to requirements of the Fort and shall match adjacent area signs. See sign information in the Fort Detrick IDG.

2.8 GRADING

2.8.1 General

Positive drainage shall be provided for all areas and existing drainage ways shall be utilized to the extent possible. A ditch parallel to Porter Street passes through the site.

Swales between buildings and parking areas shall be avoided, if possible. If not possible, they shall be graded for positive flow but flat enough to easily permit mowing and maintenance. Parking areas shall be graded such that storm water is directed off to the sides and not down the center of the parking area. Earthwork shall be balanced to the extent possible without compromising the design. Retaining walls and/or reinforced earth slopes shall only be used if necessary to locate the entire site features within the limits given (see Section 01011, Para 2.7 - NEW CONSTRUCTION). The number of existing trees to be removed shall be kept to a minimum. No grading shall be done within drip lines of existing trees to be preserved.

2.8.2 Adjustment of Existing Structures

All manhole castings, valve boxes, or inlet frames of any nature within the project that do not conform to the new finish grade in either surfaced or unsurfaced areas shall be adjusted to the new finish grade. Grade adjustment shall be accomplished using precast concrete rings, brick or masonry units and cement mortar. The maximum height of any adjustment shall be twelve (12) inches. Cement mortar shall be used where the required adjustment is one (1) inch or less. Where inlets, manholes, or valve boxes fall within a roadway or parking area, the frames and covers shall be heavy-duty (HS20-44 rated). All structures shall be of a type suitable for the intended use and shall conform to the requirements of the applicable section of these specifications.

2.8.3 Borrow and Waste

Borrow materials shall be obtained from sources outside the limits of Government-controlled land. The source of borrow material shall be the Contractor's responsibility. Approved materials shall be those classified in ASTM D 2487 as GM, GC, SW, SP, SM, SC, and CL and shall be free of trash, debris, roots or other organic matter, or stones larger than 3 inches in any dimension. These requirements shall be addressed in the specifications developed by the Contractor. The Contractor shall obtain from the owners the right to procure material, shall pay all royalties and other charges involved, and shall bear all the expense of developing the sources, including rights-of-way for hauling. Any surplus suitable materials not required for fill shall be removed from the base. Non-suitable materials shall be disposed of by the Contractor at his own expense and responsibility outside the limits of Government-controlled land at a location that meets federal, state and local requirements.

2.8.4 Sidewalks and Curbs

Concrete walks shall have a transverse grade of two (2.0) percent. Maximum desirable longitudinal walk grade shall be four (4.0) percent and an absolute maximum grade of 8.3 percent. The use of steps in walks will be avoided whenever possible. The use of single riser steps is especially discouraged. When steps are unavoidable, they should have at least three risers and will be provided with handrails. Barrier curbs shall be used along asphalt roads, drives, and parking lot edges.

2.8.5 Transverse Parking Area Grades

- a. Desirable minimum of two (2.0) percent.
- b. Absolute minimum of 1.5 percent for flexible pavement and one (1.0) percent for rigid pavement.
- c. Maximum of two (2.0) percent at handicap parking.

2.8.6 Longitudinal Parking Area Grades

- a. Maximum of five (5.0) percent

2.8.7 Ramp Grades

- a. Must comply with ADAAG standards.

2.8.8 Gutter Grades

a. Desirable minimum of 0.8 percent.

b. Absolute minimum of 0.5 percent.

2.8.9 Building Floor Elevation

Building finished floor elevation shall be set to ensure that the required minimum and maximum grades are met.

2.8.10 Grades Away From Building- Five (5.0) percent

b. Greater than ten (10) feet from building- Two (2.0) percent minimum in the direction of drainage.

2.8.11 Overland Grades

Provide positive drainage for all areas.

a. Minimum- Two (2.0) percent

b. Maximum- Ten (10.0) percent. Steeper grades/ retaining walls may be used on the perimeter of the site.

2.8.12 Ditch Slopes

a. Minimum- One (1.0) percent for channelized flow.

2.8.13 Ditches

Ditches shall be sloped so that they are non-erodible with vegetative cover. The ditch shall be lined with an appropriate material to prevent erosion. A design storm with a return period of at least two (2) years shall be used to determine erodibility of ditches and swales. The depth of ditches along pavement shoulders shall be such that the water surface from the 10-year design storm is below pavement sub base and base courses which daylight through the adjacent shoulder.

2.9 STORM DRAINAGE

2.9.1 Determination of Storm Runoff

The computation of runoff will be accomplished by the Rational Method, as defined in the Maryland State Highway Drainage Manual or by the Department of the Army Technical Manual - TM 5-820-4. Where detailed consideration of storm water retention is required, computation should be by unit-hydrograph and flow-routing procedures.

2.9.2 Design Storm Return Period

Storm drains shall be sized for a design storm with a return period of ten (10) years and culverts shall be sized for a design storm with a return period of twenty-five (25) years. Provisions shall be made to protect all buildings and critical structures from a major storm event with a return period of one-hundred (100) years.

2.9.3 Storm water Management

It shall be the responsibility of the Contractor to design a Storm Water Management (SWM) plan and to obtain a SWM permit from the Maryland Department of the Environment Water Management Administration prior to construction. The plan shall be prepared in accordance with the Code of Maryland Regulations (COMAR) 26.17.02, THE 2000 Maryland Storm Water Design Manual, Volumes I and II, dated October 2, 2000, and the Maryland Storm Water Management Guidelines for State and Federal Projects, dated July 1, 2001.

2.9.4 Storm Drainage System Design

The Contractor shall be responsible for the complete design of the storm drainage system. The new storm drainage system shall be coordinated with surrounding properties to ensure runoff does not cause damage to the other properties. The use of curb openings with flumes to drain water from streets and parking areas with curbing will be permitted. Drainage of runoff from turfed areas onto pavements shall be minimized.

Structures shall be located at all changes in direction of storm drain lines, at the intersection of two or more storm drain lines, and where required to intercept rainfall runoff. Storm runoff in streets and parking areas with curbing will be collected using curb inlets or area inlets. Drainage of runoff from turfed areas onto pavements shall be minimized. Where possible, a minimum drop of 0.1 feet between inverts of equal diameter storm drain pipes shall be provided at the centerline of drainage structures. Where storm drain pipes are of different diameters, the pipe crown elevations should be matched at the drainage structure. Storm drain pipes shall have a minimum diameter of twelve (12) inches. Storm drain pipes shall be located outside of paved areas to the extent possible. Under no circumstance shall storm drain pipes be located beneath buildings. Erosion control shall be provided for the outlets of all storm drain structures.

All storm drain pipes and structures shall be specified in UFGS Section 02630 STORM DRAINAGE SYSTEM. Submittal of pipe samples is not required. The Contractor shall refer to the Maryland State Highway Administration (MSHA) Book of Standards for any storm drain details required by the design. The Contractor shall provide details for any other drainage structures not found in the Book of Standards.

2.9.4.1 Hydraulic Design

New storm drain pipes shall be designed for gravity flow during the ten (10) year design storm unless otherwise approved by the Government. The hydraulic grade line shall be calculated for the storm drain system and all energy losses accounted for. Design computations shall adhere to procedures contained in the Maryland State Highway Drainage Manual or TM 5-820-4. Storm drain systems shall be designed to provide a minimum flow velocity of 2.5 feet per second (fps) when the drains are one-third or more full.

2.9.4.2 Manholes

The diameter of manholes shall be large enough to accommodate pipes entering/exiting the manhole. Manhole cast iron frames shall have a minimum opening diameter of thirty (30) inches. Galvanized steel ladders shall be provided in all manholes in accordance with UFGS Section 02630 STORM DRAINAGE SYSTEM.

2.9.4.3 Area Inlets

Area inlets and grates shall be properly sized and designed to accommodate the design flows. A safety factor shall be included to account for clogging by debris.

2.9.4.4 Curb Inlets

The location of parking area curb inlets at building entrances shall be avoided if possible. Curb inlets along two-lane streets shall be spaced and sized so that the flow in the gutter and ponded areas at low points does not cover the crown of the street. Grates for inlets shall be bicycle safe.

2.9.4.5 Head walls and Flared End Sections

Unless otherwise approved, head walls or flared end sections shall be provided at the ends of culverts and at storm drain outfalls. Precast concrete enwalls will be permitted. Protection from erosion at head wall and flared end section outfalls shall be provided as needed.

2.9.4.6 Culverts

Culvert pipes shall have a minimum diameter of eighteen (18) inches wherever possible, or low head pipes with equivalent capacity shall be used. The culverts shall be designed with a maximum allowable head that does not exceed the elevation of the sub grade of any adjacent road.

2.9.5 Roof Drains

Drainage from the roof areas shall be designed as to not cause an ice hazard. Gutters and downspouts shall be designed for an event with a return period of ten (10) years. Downspouts, which are located in areas that could cause a safety or maintenance concern, shall be collected underground and conveyed to the storm drainage system. Design of underground roof drain collection systems shall be done in accordance with the procedure in the National Standard Plumbing Code. Connections from downspouts to the underground collection pipes shall be via cast iron boot. Downspouts discharging to the surface shall be provided with splash blocks.

2.9.6 Storm Drain and Culvert Pipe

The Contractor shall select the appropriate storm drain and culvert pipe materials from the options specified in UFGS Section 02630 STORM DRAINAGE SYSTEM. Pipe, bedding, and backfill shall be of adequate strength (or stiffness) to support the earth, live, and construction loads imposed on the pipe. Only pipe materials that have a minimum design service life of fifty (50) years shall be allowed for permanent installations. As a minimum, all pipe joints shall be soil tight. The Contractor shall specify watertight resilient pipe connectors at drainage structures when the water table is at or above the pipeline.

2.9.6.1 Concrete Pipe

Reinforced concrete pipe shall be a minimum Class III. Type I cement may be used only when sulfates in the soil are 0.1 percent or less and dissolved sulfates in the effluent are 150 parts per million (ppm) or less. Type II cement may be used only when sulfates in the soil are 0.2 percent or less and dissolved sulfates in the effluent are 1,500 ppm or less. Only Type V cement

may be used if sulfates in the soil exceed 0.2 percent or dissolved sulfates in the effluent exceed 1,500 ppm. Concrete pipe shall be assumed to have a minimum design service life of 50 years unless the Contractor determines that conditions at the site will reduce the service life. Concrete culverts and storm drains shall be protected by a minimum of three (3) feet of cover during construction to prevent damage before permitting heavy construction equipment to pass over them during construction. The minimum cover between the top of pipe and the final grade elevation shall be in accordance with the pipe manufacturer's recommendations

2.9.6.2 Corrugated Metal Pipe

Corrugated Metal Pipe shall not be used.

2.9.6.3 Plastic Pipe

Stiffness of the plastic pipe and soil envelope shall be such that the predicted long-term deflection shall not exceed 7.5 percent. Plastic culverts and storm drains shall be protected by a minimum of three (3) feet of cover during construction to prevent damage before permitting heavy construction equipment to pass over them during construction. Split couplers shall not be allowed for corrugated high-density polyethylene (CHDPE) pipe. Plastic pipe shall be assumed to have a minimum design service life of fifty (50) years unless the Contractor determines that conditions at the site will reduce the service life.

2.9.7 Oil Separator

2.9.7.1 The Contractor shall install a new trench drain across the entire width of the exit driveway and the entire width of the entrance driveway of the new fire station. This trench drains shall include an appropriate valve system, such that outflow to the storm drainage system can be interrupted and diverted to the oil separator. The existing oil separator shall be moved and re-installed, if feasible, to a location that is easily accessible. If the existing oil separator cannot be removed and re-installed, then a new one of similar capacity shall be installed.

2.9.7.2 The connections between the trench drain and the oil separator shall be made using an appropriate pipe to handle oil flow. Abandoned lines under and within ten (10) feet of the building shall be removed.

2.10 WATER SYSTEM

2.10.1 There is an existing eight (8) inch diameter water main that runs parallel to Porter Street and a four (4) inch diameter lateral that connects the existing building to the water main. See Attachments 2-2 and 2-4 that show the location of the existing lines and their connection.

2.10.2 It is expected that a new four (4) inch lateral to the existing water main will need to be installed. The Contractor shall determine the adequacy of the existing utility connections to handle the requirements of the expanded facility and assess the need for an additional lateral. If the lateral is necessary, the Contractor shall secure approval for the water system addition as required by the Maryland Department of Environment, Health and Natural Resources Division, Public Works Section. No existing or new water lines shall be allowed underneath the new addition. Piping materials and installation beyond five (5) feet from the building shall comply with

Section 02510 Water Distribution System except as noted herein. Piping less than three (3) inches in diameter shall be limited to polyvinyl chloride plastic (PVC), oriented polyvinyl chloride plastic (PVCO), polyethylene (PE), or copper tubing. Piping three (3) inches in diameter or larger shall be limited to cement lined ductile iron, plastic (PVC or PVCO), or fiberglass (Reinforced Thermosetting Resin Pipe [RTRP] or Reinforced Plastic Mortar Pipe [RPMP]) materials. Underground water lines shall be installed to provide a minimum of four (4) feet of earth cover above the pipe from the finished site grade. After construction is complete, the Contractor's registered professional engineer shall certify that the construction was completed in accordance with the approved plans and specifications.

2.10.3 Distribution mains and sectional valves shall be arranged such that a combination of two fire hydrants, or one sprinkler system and one fire hydrant, are always available to protect the facility in case of a single break anywhere in the system. The water system shall be capable of supplying at least 50% of the fire demand in the event of a single pipe break. Fire flow requirements for sprinkler system and outside hose streams shall be in accordance with Military Handbook 1008C. The fire demand shall equal the sum of the sprinkler demand, hose demand and one-half of the domestic demand. Sprinkler and domestic water may be supplied through a bulk underground line with services separated inside the utility room.

2.10.4 The Contractor shall perform hydrant flow tests to determine available flow and pressure from the existing water system in order to determine the necessary flow data to aid in design. Further details can be found in Section 01011, Chapter 9, Fire Protection. Arrangements for testing shall be scheduled through the Contracting Officer and **Water Plant Operations**. Data shall include static pressures, residual pressures, flow rates, date and time tests were conducted, and name of personnel conducting the tests. Data shall also include a small water system map, at a scale of approximately 1 inch = 400 feet, showing the location of test hydrants and water mains in the project vicinity.

2.10.5 The Contractor shall submit layout drawings of the proposed piping system for approval. Connection points to the existing system shall be shown as well as hydrant flow test data. The Contractor shall provide design calculations showing that the flow and pressure requirements for domestic and fire demands are met. Test pits shall be made at connection points to confirm size, material and depth of existing water mains. Any discrepancies shall be reported to the Contracting Officer. A Hazen-Williams friction coefficient (C) of 120 shall be used for existing mains and 130 for new mains.

2.10.6 Interruptions to service for making connections shall be arranged and scheduled through the Contracting Officer. Dry connections shall require isolation of piping between existing valves. Before starting any work, the Contractor shall locate all valves that will be used to isolate the system. Operation of valves shall only be done under the supervision of the Post Water Department and the Contracting Officer. Outages for dry connections shall be scheduled as directed by the Contracting Officer; all affected lines shall be disinfected. A work plan shall be submitted to the Contracting Officer for approval before starting any work. Outages shall be scheduled at least forty-eight (48) hours in advance through the Fort Detrick Water Department and Contracting Officer.

2.10.7 Underground piping for a dedicated sprinkler service line (if ductile iron) shall have cathodic protection and bonded joints. Cathodic protection is not required for a combined domestic / sprinkler service line.

2.10.8 Service lines shall be of sufficient size to furnish water to the building in the quantity and at the pressure required by National Standard Plumbing Code. Domestic flow shall be determined on a fixture unit basis. Maximum velocity shall not exceed six (6) feet per second (fps).

2.10.9 Adjacent utility lines shall be separated for safety reasons. Separation between water and sewer lines shall be in accordance with UFGS Section 02510, WATER DISTRIBUTION SYSTEM, Part 3, Execution. Water lines shall not be laid in the same trench with sewer lines, gas line, fuel lines, or electrical wiring.

2.10.10 The Contractor shall install an adequate number of valves in the system. Curb stops are not permitted. Each building service shall be provided with a main shut off valve and valve box, readily accessible to maintenance and emergency personnel. A post indicator valve (PIV) shall be installed on each sprinkler service. Shutoff valves in located in sidewalks are prohibited. Valves three (3) inches and larger shall conform to AWWA C500; smaller valves shall conform to MSS SP 80, Type 1, Class 150.

2.10.11 Valve boxes shall be cast iron. Boxes shall be extension type with slide type adjustment and with flared base. The word "WATER" shall be cast in the cover. The boxes shall be of such length as will be adopted without full extension to the depth of cover required over the pipe at the valve location. Valve boxes shall be suitable for use in vehicular traffic. Where feasible valve boxes shall be located outside of roads and streets.

2.10.12 All valves and fire hydrants located near roadways shall be protected from traffic. If a post indicator valve or fire hydrant is located closer than ten (10) feet from an access drive, parking area or street, bollards shall be provided. A six (6) inch concrete curb around the traffic area is acceptable in lieu of bollards. Bollards shall be painted as directed.

2.10.13 Connections to mains shall be made by a tapping sleeve and valve whenever feasible to minimize disruption of service. If a tapping sleeve cannot be used, the connection shall be made with a mechanical tee and valve. Sprinkler service lines shall be connected to the main in accordance with NFPA 24. Post indicator valves shall be minimum of forty (40) feet from buildings.

2.10.14 Thrust blocks shall be provided at changes in direction of flow on all water lines three (3) inches or larger in diameter and fire hydrants. Thrust block sizes shall be in accordance with the pipe manufacturer's installation manual.

2.10.15 Hydrostatic tests - All lines shall be subject to pressure and leakage tests in accordance with NFPA 24 - UFGS Section 02510, WATER DISTRIBUTION SYSTEM, Part 3, Execution.

2.10.16 Disinfection - The Contractor shall disinfect all new water lines and any existing lines that do not remain fully pressurized during construction. Bacteriological disinfection shall conform to AWWA C651. Each section of service, hydrant lateral, and distribution line shall be tested. Personnel from the Contractor's commercial laboratory shall collect samples from each

section of new and/or existing line. When the isolated section length exceeds three-hundred (300) feet, intermediate line samples shall be taken every three-hundred (300) feet or increment thereof. The commercial laboratory used by the Contractor shall be certified by the State's approving authority for examination of potable water.

2.10.17 Lead residual is not permitted in new water lines. Following bacterial disinfection and testing, the system shall be flushed at each hot and cold-water discharge point and tested for lead residual as indicated in UFGS Section 02510, WATER DISTRIBUTION SYSTEM, Part 3, Execution.

2.10.18 Excavation, trenching and backfilling shall conform to USFG Section 02316 Excavation, Trenching and Backfilling for Utilities Systems. Pipe bedding materials shall conform to ASTM C33, coarse aggregate, Size #67. Bedding shall be placed from six (6) inches below pipe to one (1) foot above the pipe for plastic materials, and to the spring line of the pipe constructed of other material.

2.10.19 Plastic marking tape, blue in color, and capable of being located by a metal detector, shall be provided above the pipe but 18-inches below grade. Minimum tape strength shall be 1750 psi lengthwise and 1500 psi crosswise.

2.10.20 Pipe penetrations through structures shall be sleeved. Sleeves shall be Schedule 40 with integral collar, and furnished with mechanical link seals between the sleeve and pipe.

2.11 Sanitary Sewer System

2.11.1 The Contractor shall provide new building sewer connections in such a manner that all sewer lines can be maintained easily without major disruption to building occupants. Any new sewer line for the new facility shall be tied into an existing six (6) inch diameter line that flows southwest from the existing Fire Station through the site. Sewer line tie-ins shall be designed as gravity lines and the use of lift stations are prohibited. See Attachment 2-2 for the location of the existing sewer lines. This line should have adequate capacity to accommodate the flow from the new facility but this should be checked by the Contractor.

Connections to existing sewers shall be made using a manhole. The Contractor shall verify the capacity of existing sewers, and pipe invert elevations at the proposed connection points. Materials and pipe installation beyond the five (5) foot line from the building shall conform to Section 02531 Sanitary Sewers: Gravity, except as noted herein. The construction of sewer lines under pavement shall be avoided whenever possible. Abandoned sewer lines under and within ten (10) feet of the building shall be removed.

2.11.2 Building connections shall be sized based on drainage fixture units in accordance with the National Standard Plumbing Code. The minimum diameter of building service laterals shall be six (6) inches. The flow in the pipes shall be computed using Manning's Equation with a roughness coefficient (n) of 0.013. The minimum pipe slope shall be 0.62% for six (6) inch diameter sewers, and 0.40% for eight (8) inch diameter sewers. Flow shall be maintained in the existing sewer system at all times when making new connections, either by gravity methods or by pumping. The Contractor shall submit all plans for maintaining sanitary sewer flow to the Contracting Officer for approval prior to starting any work.

2.11.3 Piping for sewer lines shall be limited to the following materials:

2.11.3.1 Plastic Pipe

Acrylonitrile-butadiene-styrene (ABS), ASTM D 2751.

Polyvinyl Chloride (PVC), ASTM D 3034, maximum SDR of 35.

High Density Polyethylene (HDPE), ASTM F714. The pipe shall have a smooth interior with corrugated exterior. Polyethylene shall be certified by the resin producer as meeting the requirements of ASTM D3350, cell Class 334433C. The pipe stiffness shall be equal or greater than $1170/\text{Diameter (D)}$ for cohesion less pipe trench backfills.

2.11.3.2 Cast Iron (CI), ASTM A74.

2.11.3.3 Ductile Iron (DI), AWWA C151.

2.11.3.4 Vitrified Clay/Extra Strength (XVC), ASTM C700.

2.11.4 Exterior cleanouts shall be provided for building waste piping at the five (5) foot line, at directional changes, and in the middle of straight runs longer than 150 feet. Cleanouts shall be the two-way type, which allows cleaning in either direction.

2.11.5 Sanitary sewer lines shall have a minimum cover of thirty (30) inches. Plastic marking tape, green in color, and capable of being located by a metal detector, shall be provided above the pipe, eighteen (18) inches below grade. The minimum tape strength shall be 1750 psi lengthwise and 1500 psi crosswise.

2.11.6 Manholes shall be provided at the points of connection to existing lines, and at all changes in direction, size or slope of gravity sewers. They shall not be spaced more than three-hundred (300) feet apart. Manholes shall be precast, reinforced concrete sections (risers) that conform to ASTM C478. The base section shall have a six (6) inch flange, monolithic with the riser, and shall extend at least sixteen (16) inches above top of pipe. Welded wire fabric reinforcement in the precast sections reinforcement shall conform to ASTM A 185. At least six (6) inches of granular bedding shall be placed under the base. It shall be coarse aggregate Size #4 that conforms to ASTM C33, and shall be nominally compacted to provide a uniform, firm under layer. The inside diameter of the risers shall be a minimum of four (4) feet, with a top section that can accommodate a manhole casting with a minimum diameter of thirty (30) inches. Manhole bench and invert channels shall be formed using concrete. Manhole joints shall be double-strip butyl rubber mastic adhesive. Pipe connections shall utilize a watertight rubber boot or sleeve conforming to ASTM C923 or C443; sleeves shall be secured with a stainless steel clamp. Manhole steps shall 12-inch wide, rubber coated, rated for a three-hundred (300) pound loading, installed on sixteen (16) inch centers, and securely embedded in concrete. Frames and covers shall be ductile iron. The words "SANITARY SEWER" shall be cast on the cover and plainly visible. Avoid placing manholes where the tops will be submerged or subject to surface water inflow. Where the invert of the inlet pipe is more than eighteen (18) inches above the manhole floor, a drop connection shall be provided. Manholes shall be designed for uplift (buoyancy) assuming that the groundwater table can reach the top of manhole sidewalls. Pipe joints shall be located at a distance of two (2) feet minimum or no more than four (4) feet maximum from the outside wall of manholes.

2.11.7 Lines shall be tested for leakage by low pressure air testing. Low pressure air testing shall be done in accordance with the pipe manufacturer recommendations. The Contractor shall visually inspect the section of line before backfilling to assure that joints are tight and the sewer is laid to proper line and grade. Lines shall be air tested using pneumatic plugs inflated to twenty-five (25) pounds per square inch gage (psig). Air shall be introduced into the sealed line until internal pressure is 4 psig greater than the average backpressure of any groundwater over the pipe. After a stabilization period of at least two (2) minutes, the pressure shall be adjusted to 3.5 psig and the air supply disconnected. The line shall be acceptable if the time required for the pressure to decrease from 3.5 to 2.5 psig is not less than the time computed as follows:

TIME REQUIRED IN MINUTES AND SECONDS FOR AIR PRESSURE TO
DROP FROM 3.5 PSIG TO 2.5 PSIG

Pipe Dia. (in) L =	100 ft	200ft	300ft
6	2:50	2:50	2:50
8	3:47	3:47	3:48

When times are less than specified, a satisfactory correction of the problem shall be made and the line retested. Testing, correction and retesting shall be made at no additional cost to the Government.

2.11.8 A deflection test for plastic pipe shall be made not less than thirty (30) days after the completion of all work including leakage test, backfill and placement of fill, grading, pavement, concrete, or superimposed loads. The test shall be conducted in accordance with manufacturer recommendations. Installed pipe that shows deflections greater than 7.5% of the normal diameter of the pipe, shall be retested by a run from the opposite direction. If the retest also fails, the suspect pipe shall be replaced at no cost to the Government.

2.11.9 Excavation, trenching and backfilling shall conform to UFGS Section 02316 EXCAVATION, TRENCHING AND BACKFILLING FOR UTILITIES SYSTEMS. Pipe bedding materials shall conform to ASTM C33, coarse aggregate, Size #67. Bedding shall be placed from six (6) inches below pipe to one (1) foot above pipe for plastic materials, and to the spring line of pipe for other materials.

2.11.10 Pipe penetrations through structures shall be sleeved. Sleeves shall be Schedule 40 with integral collar, and furnished with mechanical link seals between the sleeve and pipe.

2.11.11 Pipe connections to existing manholes shall utilize a watertight rubber gasket as specified for new manholes. Manhole benches shall be reworked to accommodate new flow conditions. Existing manhole covers shall be adjusted flush with the finished grade in paved areas, and two (2) inches above finished grade in unpaved areas.

2.11.12 Adjacent facilities - Separation between water and sewer lines shall be in accordance with UFGS Section 02531 SEWERS, Part 3, Execution.

2.12 GAS LINES

2.12.1 General - The Contractor shall determine if the existing gas service needs to be increased. The Contractor shall provide design calculations for the required line size, pressure, and flow rate, which shall be based on the building demand. If necessary, the Contractor is responsible for construction of the gas service line from the point of delivery within five (5) feet of the building. The point of delivery is the meter set assembly. The Frederick Gas Company will construct the service line from the gas meter to the existing gas distribution main. The contractor is responsible for coordination all aspects of the construction with the gas company, including the cost of installation and payment for the work. Payment shall be made prior to the start of construction. The contractor is also responsible for coordination of the service line installation with the Fort's Directorate of Installation Support (DIS).

2.12.2 Service Interruption - Interruption of gas service shall be minimized during construction of the new line. The Contractor shall notify the Contracting Officer, in writing, at least ten (10) days in advance before connecting to existing lines.

2.12.3 Service Line - The service line shall be constructed of materials specified for gas. It shall be constructed as short and straight as possible with as few joints as practicable. Sharp changes in direction and tie-ins to existing lines shall be accomplished using standard fittings. Pressure testing of the line shall be completed prior to placement of any backfill. The line shall have a minimum cover of four (4) feet.

2.12.4 Shutoff Valves - The service line shall be equipped with a sufficient number of valves, having the same size as the service line, so that the line and building can be shutoff and/or isolated from the distribution main. The valves shall be contained in valve boxes.

2.12.5 Pressure Relief/ Regulators - The service line shall be equipped with pressure/relief valves to regulate the pressure of the line and provide a suitable method to prevent over-pressuring of the system in accordance with ASME B31.8 and NFPA - National Fuel Gas Code, 1999.

2.12.6 Pipe Protection - All metallic pipes shall have protective coating in accordance with UFGS Section 02556 GAS DISTRIBUTION SYSTEMS, Para. 2.7 and/or cathodic protection for corrosion control in accordance with Section 01011, Chapter 10.0, Electrical, General Requirements, Para 10.1.6 - Corrosion Control.

2.12.7 Meters - The gas meter for the building shall be suitable for accurately measuring the handling gas at the pressures, temperature, and volume required. The meter shall be equipped with an over-pressure protection.

2.12.8 Drips - The service line shall be supplied with drips and blow off lines at locations as required. Drips shall be a commercial unit of the approved type and capacity.

2.12.9 Excavation and Backfill - Excavation of trench for the pipe and backfill shall be as specified in UFGS Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

2.12.10 Underground Marking - The pipe shall have a magnetic backed tape, using the standard color for gas pipe installation, placed in the trench above the pipe for future location using a magnetic detector.

2.13 PERMITS

2.13.1 Erosion and Sediment Control

The Contractor shall be responsible for selecting and implementing Best Management Practices (BMPs) to minimize pollutants in storm water discharges associated with construction activity at the construction site. The Contractor shall maintain all erosion and sediment measures and other protective measures in effective operating condition. All temporary erosion control measures shall be removed once the corresponding disturbed drainage area has been permanently stabilized. The project will require coverage under the State of Maryland's Storm Water General Permit for Construction Activities. The Contractor shall be responsible for compliance with State of Maryland's National Pollution Discharge Elimination System (NPDES) permit requirements for storm water discharges from construction sites in accordance with Section 01561 ENVIRONMENTAL PROTECTION of the specifications. Included in the permit requirements is the mandate for the Contractor to design and obtain approval for an Erosion and Sediment control plan in accordance with the Maryland Standards and Specifications for Soil Erosion and Sediment Control Manual. Also, the plan shall be coordinated with and submitted for approval to Rosario Dimarco, DIS, at (301) 619-2429 and with the NAB Construction Representative.

2.13.2 Storm Water Management

The Contractor shall obtain a Storm Water Management Permit from the State of Maryland Department of the Environment prior to construction. Refer to Section 01011, Para 2.9.2, Storm Water Management for details. Also, the plan shall be coordinated with and submitted for approval to Rosario Dimarco, DIS, at (301) 619-2429.

2.13.3 NPDES Permit

The Contractor shall be responsible for compliance with the State of Maryland's National Pollution Discharge Elimination System (NPDES) permit requirements for storm water discharges from construction sites. The Contractor shall obtain an NPDES permit from the Maryland Department of the Environment.

2.13.4 Excavation Permit

The Contractor shall be responsible for obtaining an Excavation Permit from the Fort's DIS prior to construction. Methods/limits of excavation shall be worked out with the Fort during this process; utility work adjacent to and in the vicinity of Porter Street shall not disrupt traffic. Also, any excavation or ground penetration has to be approved by the DIS. POC is Barry Schmidt at (301) 619-2316.

LEGEND

- - - 350 - - - Existing Contour
- - - Fence to be Retained
- - - Ex. Pavement or Sidewalk (retained)
- - - Proposed Pavement
- - - Proposed Sidewalk
- - - ATFP Standoff

Existing Building

Proposed Building

(14) Required Parking Spaces

(S) Fire Emergency Signal

(R) Restricted Access



10 0 10 20 30 40 50 Feet

Future
AAFES Site

x362.9

PROPOSED SPACE FOR PERMANENT ADDITIONAL
PARKING AND TEMPORARY SPACE FOR FIRE
EQUIPMENT AND POSSIBLY TEMPORARY FACILITIES.

Future
Commissary
Site

Automatic
Gate

Fire Dept. & PMO
Parking Only

Automatic
Gate

x361.7

TRAIL

Proposed Drive-thru
Apparatus
Bays

Flag
pole

Phone
Booth

100
WYOM

PARKING
PROPOSED CONTRACTOR
STAGING AREA

APPROX.
LOCATION OF
MEMORIAL

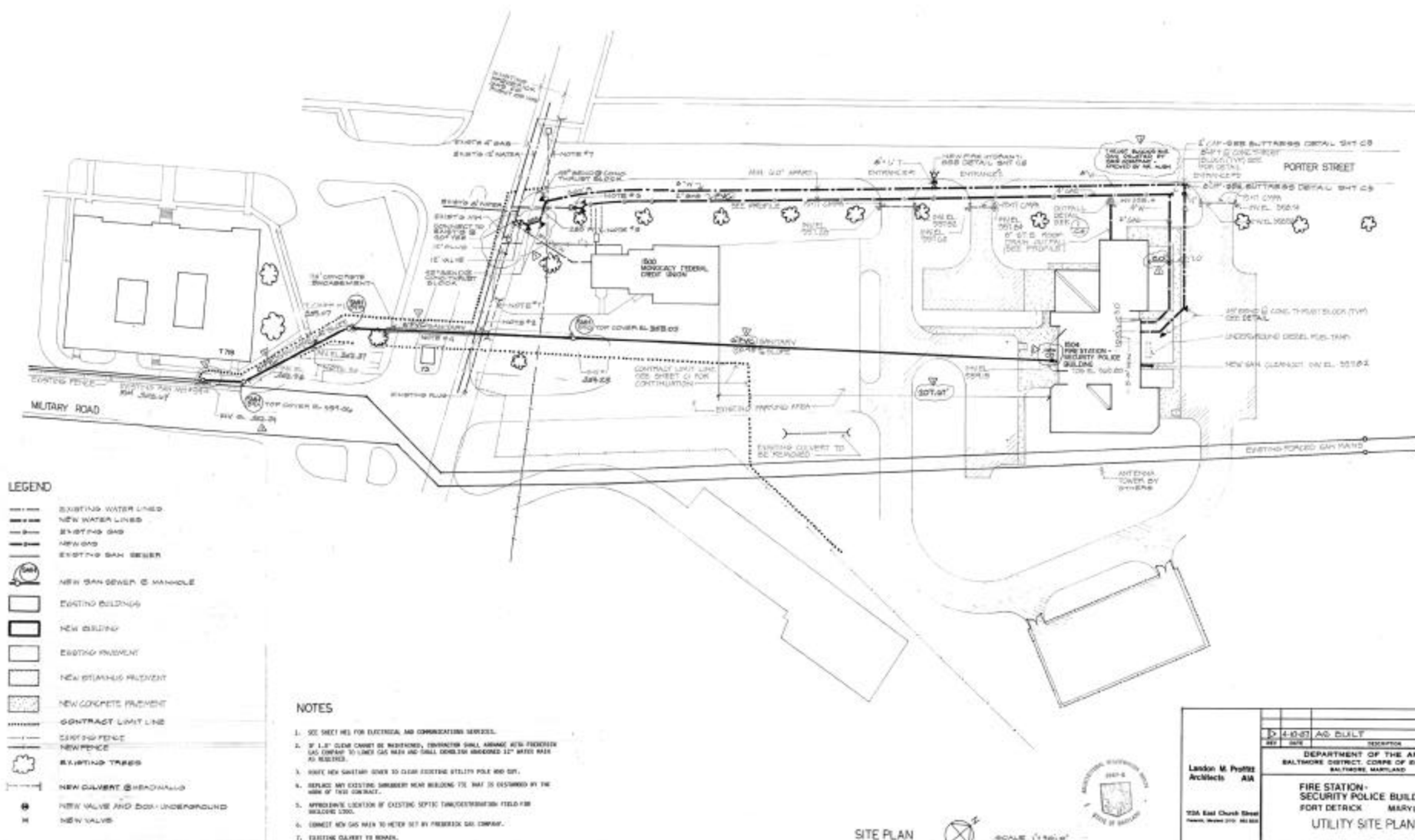
To Commissary Site

PORTER STREET

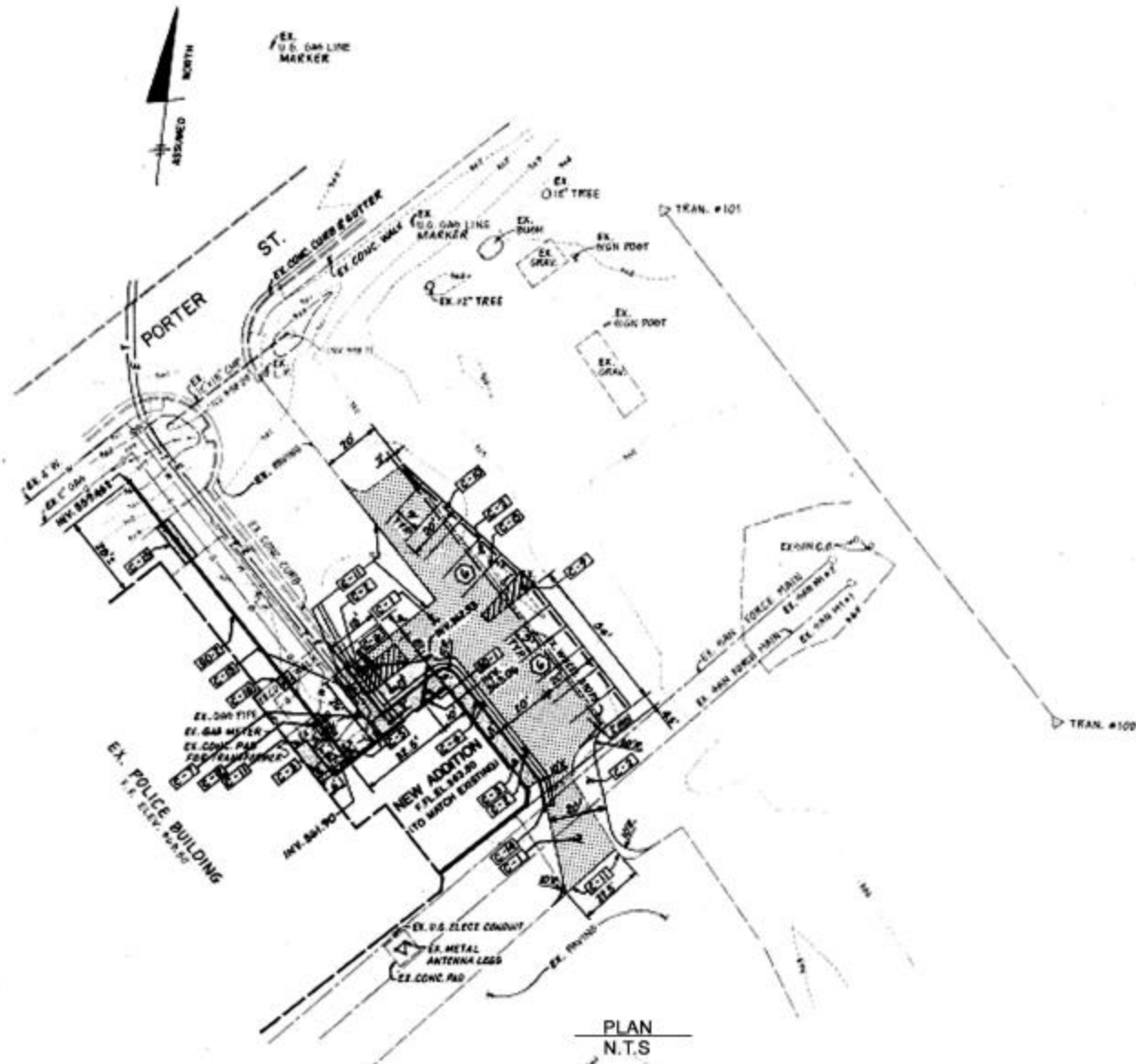
APPROX.
INTERSECTION
WITH FUTURE
ROAD

FENCE ON INSTALLATION BOUNDARY

ATTACHMENT 2-1



ATTACHMENT 2-2
REFERENCE DRAWING



- CONSTRUCTION NOTES:**
- C-1 NEW BITUMINOUS OVERLAY, SEE DETAIL 1, SHEET CE-4
 - C-2 NEW BITUMINOUS PAVING, SEE DETAIL 1, SHEET CE-4
 - C-3 NEW CONCRETE BORDERS, SEE DETAIL 1, SHEET CE-4, WHERE NOT SPECIFIED, 6\"/>
 - C-4 NEW CONCRETE CURB AND GUTTER, SEE DETAIL 1, SHEET CE-4
 - C-5 NEW WALK WALLS, SEE ARCHITECTURAL CHANGES
 - C-6 NEW HANDICAP PARKING SPACE, SEE DETAIL 1, SHEET CE-4
 - C-7 NEW HANDICAP PARKING SPACE, SEE DETAIL 1, SHEET CE-4
 - C-8 NEW STANDARD PARKING SPACE, TYPICAL, SEE DETAIL 1, SHEET CE-4
 - C-9 NEW PAINT STRIPING, SEE DETAIL 1, SHEET CE-4
 - C-10 RELOCATED WHEEL STOP, TYPICAL, PROVIDE CE-1 NO. 1 REBAR X 1\"/>
 - C-11 NEW FURNISHING CONDITIONS
 - C-12 NEW 4\"/>
 - C-13 NEW BURNING RAMP, SEE DETAIL 11, SHEET CE-4
 - C-14 NEW DOWN CURB DETAIL 11, SHEET CE-4
 - C-15 NEW CONCRETE WALK TRENCH REPAIR, SEE DETAIL 11, SHEET CE-4

- STORM DRAIN NOTES:**
- SD-1 NEW 4\"/>
 - SD-2 NEW 4\"/>

REFERENCE NOTES:
FOR LEGEND AND GENERAL NOTES SEE SHEET CE-1.

PLAN
N.T.S.



	DATE: 10/1/98 DRAWN BY: J.S.M. CHECKED BY: J.S.M. IN CHARGE: J.S.M.	DIRECTORATE OF ENGINEERING AND HOUSING BUILDING 1504 ADDITION LAYOUT PLAN F-93-1-9085
	PROJECT NO.: 24225 SHEET NO.: 2 OF 2	
	ATTACHMENT 2-3 REFERENCE DRAWING	

CHAPTER 3
GEOTECHNICAL



US Army Corps of Engineers
Baltimore District

January 2003

FIRE STATION EXPANSION AND RENOVATION
FT. DETRICK, MARYLAND
REQUEST FOR PROPOSAL
GEOTECHNICAL INFORMATION

Prepared by:
U.S. Army Engineer District, Baltimore
Engineering Division
Geotechnical Branch
January 2003

SECTION 01011

FOUNDATION AND GEOTECHNICAL DESIGN

3.1 DESCRIPTION

A preliminary geotechnical report for the proposed Fire Station Expansion and Renovation is included in this section and is based on borings performed in 1983 for the existing Fire Station and Security Police Building. The report describes the general subsurface conditions at the project site as well as design and construction requirements for the geotechnical aspects of the project.

3.2 REQUIREMENTS

The geotechnical data and recommendations included in this report are preliminary. They are intended to provide the Request for Proposal (RFP) bidders with sufficient information to identify the general subsurface conditions at the site. The selected design/build firm's geotechnical engineer shall perform a site specific geotechnical exploration and testing program to accurately characterize the site and shall perform the final design for all geotechnical features of work. The Contractor is fully responsible for acceptable foundations, pavements, and other geotechnical aspects of the proposed project. The additional investigation, identification of subsurface materials and laboratory testing of soils and aggregate materials, shall be in accordance with applicable ASTM standards and good geotechnical practice.

3.3 DESIGN ANALYSIS

Submit design analyses with calculations for the foundation and pavement designs. The calculations shall be legible, orderly and easily understandable. All assumptions and references to codes, standards, criteria, drawings, and computer output shall be noted as necessary. Submission shall also include soils information upon which the designs are based.

3.4 SPECIFICATIONS

Submit new specification sections in accordance with requirements listed in the this RFP package, to specify the quality, characteristics, construction and installation procedures, testing, and certification requirements for all items of the proposed foundation systems, pavements, and earthwork.

3.5 COMPLIANCE VERIFICATION

Compliance with the design criteria will be determined by review of the design calculations, drawings and specifications submitted; by review of construction submittals; and by field inspection.

End of Section

FIRE STATION EXPANSION AND RENOVATION – FORT DETRICK, MARYLAND

REQUEST FOR PROPOSAL (RFP) – GEOTECHNICAL REQUIREMENTS

I. Project Location and Intent of Geotechnical Data/Recommendations

- A. Project Location and General Scope: The Fire Station Expansion and Renovation project is located at Ft. Detrick, MD, near the 7th street main entrance to the post. The project site is bound to the south by the installation boundary and to the north by Porter Street, just east of its intersection with Ditto Avenue. The project entails the construction of a new apparatus bay addition and renovation of the existing fire station. Supporting infrastructure such as pavements and utilities are included in the project scope.
- B. Intent of Geotechnical Data/Recommendations: The geotechnical data and recommendations included in this report are preliminary. They are intended to provide the Request for Proposal (RFP) bidders with sufficient information to identify the general subsurface conditions in the vicinity of the site. The selected design/build firm's geotechnical engineer shall perform a site specific geotechnical exploration and testing program to accurately characterize the site and shall perform the final design for all geotechnical features of work.

II. Subsurface Conditions

A. Regional Geology:

a. Frederick Valley: The proposed project site is located in the Frederick Valley Subprovince, a subdivision of the Piedmont Physiographic Province Upland Region. Rock of the Frederick Valley forms a syncline, which is bounded on the west by a major high-angle reverse fault and on the east by an overthrust fault. The minor folds in the Frederick syncline trend N20°E. The Frederick Valley is underlain by Cambrian and Ordovician age folded limestone upon which lie scattered Triassic shales, sandstones, and siltstones of the Newark Group. The valley contains many karst features characteristic of carbonate rock terrain (e.g., sinkholes, large springs, subsurface drainage, and closed depressions). Dip of strata is usually steep, and in the vicinity of Fort Detrick is on the order of 30° to 50°. Geologic units underlying Fort Detrick from top to bottom are as follows: Quaternary Mountain Wash, Triassic Newark Group, and in the region of the Fire Station project site, the Frederick Formation.

b. Fredrick Formation: The Frederick Formation is composed primarily of gray slabby to thinly bedded limestone with minor shale seams and has been further subdivided into three members: The Rocky Spring Station, the Adamstown, and the Lime Kiln members. The unit underlying the project site is the Adamstown member.

This member is a fine-grained, thinly bedded at 1/2 to 2 inches, dark gray, over 1000 feet thick, argillaceous limestone and contains numerous small fractures filled with white secondary calcite. The Adamstown member is interrupted by three zones less than 100 feet thick of coarse peloidal and megaclastic limestone.

- B. Subsurface Data: Site specific geotechnical exploration, testing and design for the project is the responsibility of the selected design/build firm. Geotechnical information from the original fire station project design is included at the end of this report to provide RFP bidders with sufficient information to identify the general subsurface conditions at the site. The discussion of soil and rock conditions herein is based upon the information presented in these borings. Exploration for the original fire station was performed in July and August of 1983 and the boring locations and boring logs are attached to this report. The drill holes were advanced by means of the Standard Penetration Test (SPT) procedure. The SPT procedure advances a 1-3/8" interior diameter by 2'-8" long split spoon sampler using a 140-lb hammer falling 30". Rock was cored with an NXM series core bit. RDQ values, when determined, are shown in column (b) on the boring logs where rock was cored.
- C. General Stratigraphy: This paragraph discusses the site soil stratigraphy based on the information presented in the boring logs for the original fire station project. Soil thickness is variable due to the irregular bedrock surface and ranges from approximately 10 feet (DH-6) to 26 feet (DH-7). The soil stratigraphy can generally be described as consisting of a residual soil layer on top of bedrock. The residual soil is derived from the in place weathering of the parent limestone and shale bedrock. The soils almost entirely consist of yellowish brown to dark brown clays and silts (USCS classifications CL, CH, ML, and MH) containing large amounts of gravel and sand sized shale fragments. In some areas, the percentage of shale fragments exceeds 50 percent, changing the classification of the soil to a SC or SM. As is characteristic of residual soils over limestone, the stiffness of the soil decreases with depth (as exhibited by decreasing blows with depth). The upper soils have blow counts ranging from 10 to 26, while the lower soils typically drop in blows to a range of 2 to 11. The soils near the rock surface are more recently formed (from weathering of the rock) than those above, have had less time to consolidate and therefore have reduced shear strengths (stiffness). The presence of groundwater also tends to reduce the strength of the lower soils.
- D. Groundwater: The karstic nature of the regional geology makes it difficult to predict local groundwater conditions. The occurrence of solution cavities, clay seams, and fractures will impact local groundwater levels and flow behavior. In general, groundwater was previously encountered at the fire station site at a depth of 23 feet below ground surface. It is not anticipated that groundwater will present a problem during construction of the building foundations; however, groundwater may be present during construction of deep utilities.

III. Earthwork

- A. Site Drainage Requirements: Proper drainage should be employed to minimize exposure of the site soils to moisture and to prevent surface runoff from entering excavations. Dewatering should be used to remove any surface runoff or groundwater which enters the excavations.
- B. Fill, Backfill and Subgrade Moisture Control and Compaction: To achieve the desired long-term soil strength characteristics, the earthwork specifications shall require all fill, backfill and subgrade materials to be compacted at soil moisture contents within plus or minus 2% of optimum moisture content. All fill, backfill and subgrade material shall be compacted to 90% of laboratory maximum density (ASTM D 1557, Procedure C) for cohesive soils and to 95% of laboratory maximum density for cohesionless soils. A large portion of the on-site soils will have moisture contents well above optimum moisture (8% or more above optimum). These high moisture contents, coupled with the affinity of the materials for absorption of additional moisture during construction, will create excessive difficulty in attempting to dry the soils to within the specified moisture contents. The use of on-site soils will be best suited for grassed areas. It should be anticipated that the contractor will need to import fill in the building and pavement areas from off site. Backfill shall be placed in loose lifts not exceeding 8 inches. Lift thickness shall be limited to 6 inches where hand-operated compaction equipment is used. In grassed areas, these requirements may be relaxed to 85% and 90% of maximum density for cohesive and cohesionless soils respectively at a moisture content which will facilitate this compaction.
- C. Utilities and Drainage in Karst Areas: The design should consider sinkhole potential due to karst geology and employ appropriate design features to minimize this risk. Required procedures include but are not limited to the following:
- flowable fill as bedding and initial backfill for water bearing utilities to 10 feet outside the building limits.
 - roof runoff should not be discharged near the building at the ground surface.
 - prevent water ponding. Drainage should be directed away from buildings. Fill around the building should be cohesive at surface to minimize infiltration.

IV. Pavement Design

- A. General: Bituminous and concrete pavements must be designed to meet both strength and frost protection requirements in accordance with the latest Department of the Army criteria. The following references must be used in the design of the pavements:

TM 5-809-12

Aug 87

Concrete Floor Slabs on Grade Subjected
to Heavy Loads

TM 5-822-2	Jul 87	General Provisions and Geometric Design for Roads, Streets, Walks and Open Storage Areas
TM 5-822-5	Jun 92	Pavement Design for Roads, Streets, Walks and Open Storage Areas

Pavement designs must be included in the project design submissions for review. Pavement design forms, which are based upon the TM's, are attached to summarize the design process. These forms are provided only to assist in the design process and the final authority for all design issues shall be the TM's. Pavement design programs can be downloaded from <http://www.pcase.com>

- B. Proof Rolling: All subgrade soils beneath pavement areas should be proofrolled with a loaded, minimum 10 cubic yard haul truck prior to construction of the pavement section. Any soft, pumping or rutting soils shall be stabilized or removed and replaced.
- C. Concrete Strength: Concrete pavements shall be designed for a minimum flexural strength of 650 psi at 28 days. During construction, the concrete mix design, strength tests, etc shall also be based on flexural strength criteria.
- D. Traffic: The design index for use in determining the final pavement sections shall be based on information (traffic types & frequencies) provided by the customer during the design. For bidding purposes, a design index = 4 should be assumed. One exception is that a design index = 2 should be assumed for any parking lot areas which receive only passenger car and pickup truck traffic. The user has provided a list of the vehicles to be used in the Apparatus Bays. See attached Apparatus Information sheet for vehicle type, model, weight, wheel base and length.
- E. Subsurface Drainage: As the soils at the site are frost susceptible, a pavement subdrainage system is required to help prolong the pavement life (per TM 5-820-2, Mar 79 criteria, and ETL1110-3-435, May 92). This system consists of a series of perforated pipe subdrains used in combination with a relatively open graded aggregate layer (Rapid Drainage Material - RDM) within the base course. The subdrains shall be placed along the edges of roadways and at 50 ft to 75 ft intervals within large paved areas so as to effectively drain the pavement base course. The subdrains shall consist of a 6 inch minimum diameter perforated pipe surrounded by a minimum of 3 inches of ASTM C33, #57 crushed stone on the bottom, 6 inches (minimum) on each side, and sufficient crushed stone above the top of the pipe to extend to the Rapid Drainage Material layer within the base course. The crushed stone filter material will be completely enveloped in a filter fabric meeting the requirements of AASHTO M-288-96, Class 2. General details illustrating the subdrainage system are attached.

The drainage layer within the base course shall be a 4" to 6" thick layer of rapid drainage material (see COE guide specification 02714 Drainage Layer) sandwiched between more densely graded base course materials (such as Maryland Graded Aggregate Base – see specification 02722 Aggregate and/or Graded Crushed Aggregate Base Course), except in concrete areas where RDM is used directly below the concrete pavement and underlain by a dense graded base course layer. The RDM materials should meet the gradation requirements below.

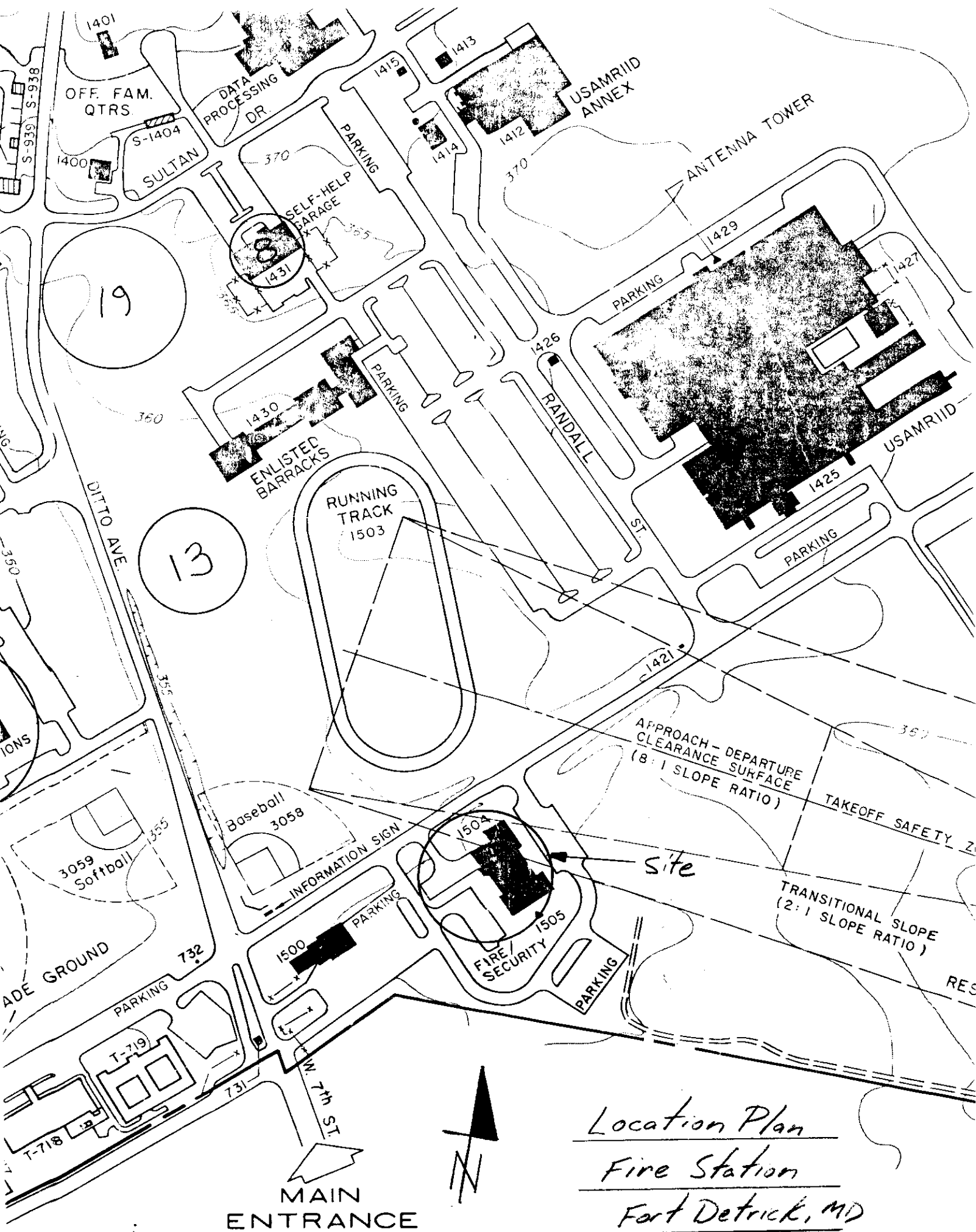
The RDM aggregates shall have a 2-inch maximum size and shall be continuously graded within the following limits:

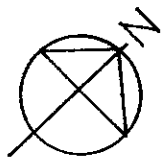
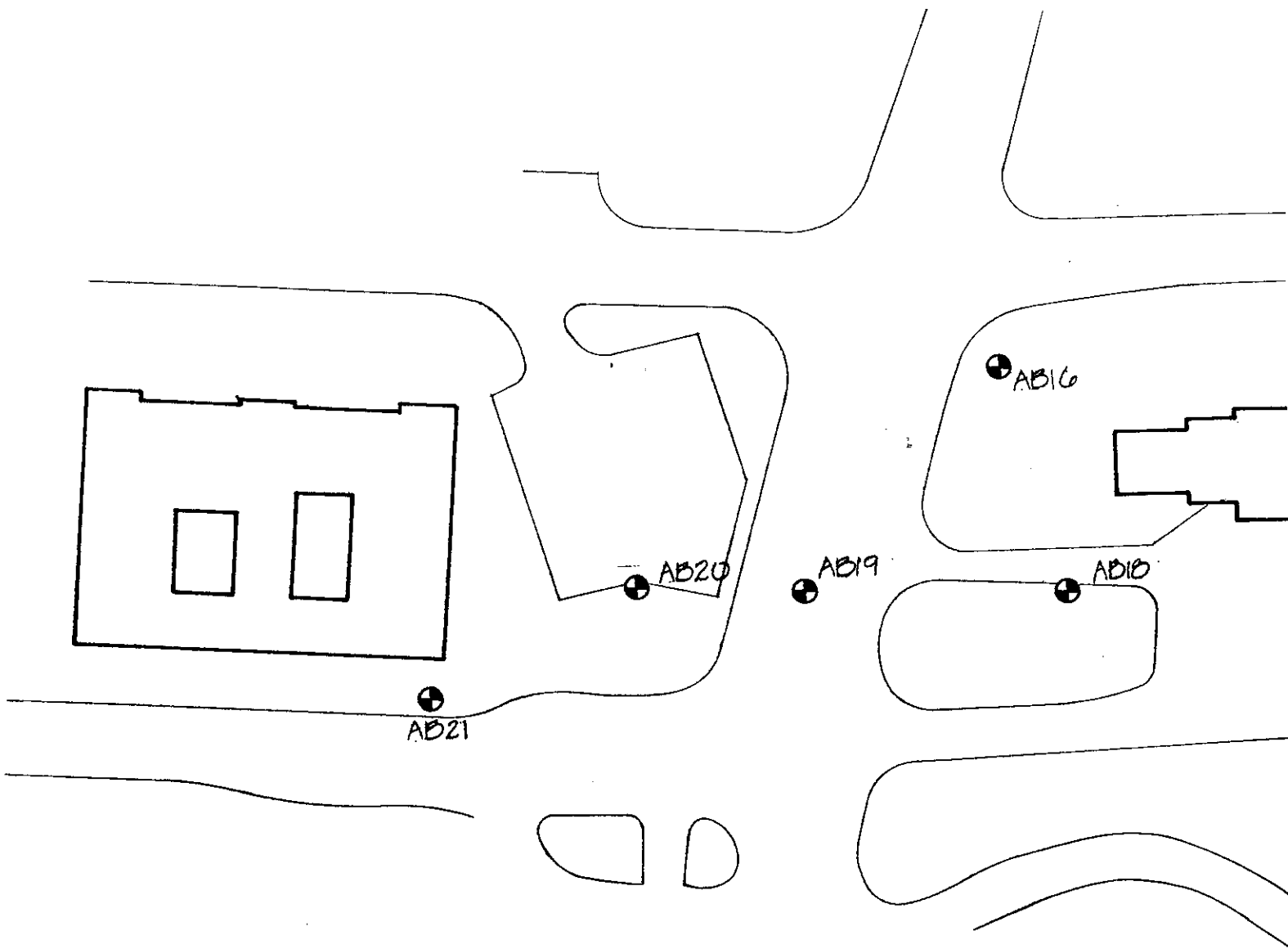
Sieve Designation	Percentage by Weight Passing Designated Square-Mesh Sieve		
	(a) No. 1	(b) No. 2	(c) No. 3
2-inch	100	100	----
1-1/2 inch	100	---	100
1-inch	95-100	---	96-100
3/4-inch	82-92	52-100	70-83
1/2-inch	62-80	---	44-70
3/8-inch	59-73	36-65	38-59
No. 4	40-55	8-40	24-33
No. 8	5-25	---	20-29
No. 16	0-5	0-12	12-21
No. 50	0-2	---	2-8
No. 100	----	---	0-3
No. 200	----	0-5	----

A 50% - 50% blend of No. 57 and No. 9 coarse aggregate (ASTM D 448) will fall within the above gradation band No. 1. A 75% - 25% blend of No. 57 coarse aggregate and concrete fine aggregate (ASTM D 448) will fall within gradation band No. 3. The materials shall be blended at the source prior to shipping to the project site.

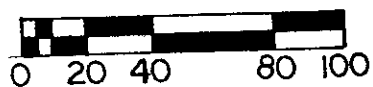
V. Foundation Design

The actual site specific geotechnical investigation and design shall be performed by the selected design/build firm's geotechnical engineer in accordance with standard geotechnical practice. The determination of allowable bearing capacity shall consider shear failure, settlement criteria, fill induced settlements and all other relevant factors. Substantiating calculations shall be included with the project design submissions. Foundations must bear below frost depth and into virgin soils.

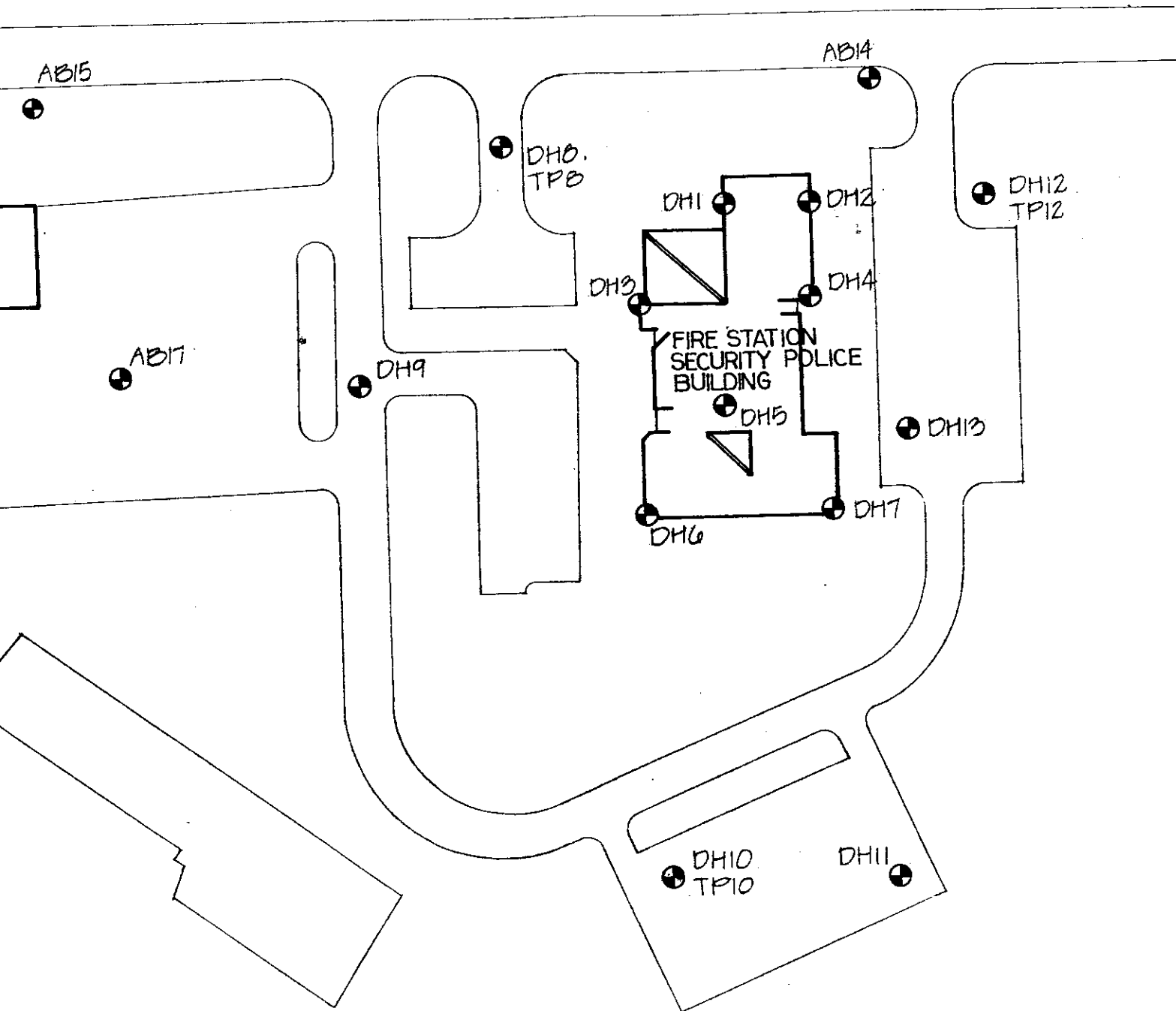




SUBSURFACE EXPLORATION PLAN SCALE 1"=60'-0"



~~NOTE - SEE PLATES 33 AND 34 FOR BORING LOGS~~



NOTES


1. EXPLORATION WAS PERFORMED DURING JULY AND AUGUST 1983.
2. AUGER BORINGS (AB) WERE MADE WITH A POWER AUGER USING AN 8" O.D. SPIRAL BIT.
3. DRILL HOLES (DH) WERE ACCOMPLISHED BY STANDARD PENETRATION TEST PROCEDURE USING A 1-3/8" I.D. x 2'-8" LONG SPLIT SPOON. SAMPLE SPOONS WERE ADVANCED BY A 140# HAMMER FALLING 30". THESE HOLES WERE POWER AUGERED BETWEEN SAMPLES. THE FIRST BLOW COUNT IN A GIVEN LENGTH OF DRIVE IS FOR 0.5'; THE SECOND BLOW COUNT IS FOR 1.0', UNLESS OTHERWISE INDICATED.

L.O.D. DENOTES LENGTH OF DRIVE.

P DENOTES PRESSED SHELBY TUBE.

ROCK WAS CORED WITH AN NXM SERIES CORE BIT.

RQD VALUES, WHEN DETERMINED, ARE SHOWN IN COLUMN (b) WHERE ROCK WAS CORED.

4. BLOW COUNTS REQUIRED TO ADVANCE SPOON ARE SHOWN IN COLUMN (a), EXCEPT PERCENT CORE RECOVERY WHICH IS INDICATED WHERE ROCK WAS CORED.
5. THE NATURAL WATER CONTENTS IN % OF DRY WEIGHT OF THOSE SAMPLES TESTED ARE SHOWN IN COLUMN (b).
6. DEPTHS BELOW GROUND AND SOIL DESCRIPTIONS ARE SHOWN IN COLUMN (c).
7. SOIL DESCRIPTIONS ARE LABORATORY CLASSIFICATIONS BASED ON THE UNIFIED SOIL CLASSIFICATION SYSTEM (MIL-STD-619B).
8. GROUNDWATER DEPTHS ARE INDICATED ON THE LOGS AS  AND ARE SHOWN IN COLUMN (d). PERTINENT DATA FOR THESE READINGS ARE SHOWN IN THE RIGHT HAND MARGIN UNDER GROUNDWATER DATA. THESE READINGS MAY VARY DEPENDING UPON SEASONS AND AMOUNT OF RAINFALL.
9. ELEVATIONS SHOWN ON THE BORING LOGS ARE GROUND SURFACE ELEVATIONS AT THE TIME OF EXPLORATION. THEY WERE DETERMINED BY SURVEY.
10. TEST PITS ARE DENOTED TP.
11. FOR LOCATIONS OF SUBSURFACE EXPLORATIONS, SEE PLATE 7.

	(a)	(b)	(c)	(d)
1.5	4	0.0	Brown silty SAND (SM) w/roots and rock fragments	
2.5	25			
4.0	6	22.9	Yellowish sandy CLAY (CH) w/rock fragments	
5.0	13			
6.5	3	P 33.3	5.0 Brnish yellow sandy SILT (MH) with rock fragments	
7.5	7			
9.0	2	24.9	7.0 Yellow-brown sandy SILT w/rock fragments (ML)	
10.0	16			
11.5	6	27.1	12.0 Yellow-brown silty clayey SAND w/rock fragments (SC)	
12.5	22			
14.0	4		14.5 Yellow-brn sandy SILT (ML) w/rock fragments	
15.0	21	P 35.8	17.0 Yell. brn & gry. silty clayey SAND w/rock frags. (SC)	
16.5	4			
17.5	2			
18.5	52 (0.5')	17		
20.2	88	0	LIMESTONE: lt. bluish gray (±0.1 thick) alternating with thin (1/4"-3/4") seams of black shale. Hard, brittle, fractured & re-cemented w/ calcite. Dip = ±45°	
21.6	57	0		
23.7	38	0		
27.0	91	47	Shale seams are weathered to brown clay above 20.2'. Some evidence of solution eroded fracture or seam in core loss zone 21.8'-22.2'. Hard, unweathered 23.7'-27.0'	
			27.0	
			BOTTOM OF HOLE	

DH-1

HOLE COMPLETED 1 AUG 83

TOP OF HOLE

EL 360.3

FORT DETRICK, MD.
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA

While drilling: Not encountered
24 hours after completion: not encountered, hole caved

Pressed Shelby tube (P) samples were taken from an additional hole (DH-1A) put down adjacent to this hole.

	(a)	(b)	(c)	(d)
1.5	10	0.0	Brn. clayey silty SAND (SM)	
2.5	60		w/ small roots	
4.0	8	19.5	yellow-brn. sandy CLAY w/ rock fragments (CL)	
5.0	26			
6.5	4	26.9	yellow-brown sandy SILT w/ rock fragments (ML)	
7.5	9			
9.0	3		Gry-brn. mixture of ROCK FRAGMENTS w/ sand, silt and clay (GC)	
10.0	26			
10.3	10.3' → 30	10.3	LIMESTONE, hard, stylo-litic, fractured & healed w/ black shale & calcite veinlets. Possible solution voids 12.7'-14.2'. Weathered 30° bedding planes above 14.9'	
12.4	Top of Rock 100	100		
14.8	38	0		
17.4	100	31		
			BOTTOM OF HOLE	

DH-2

HOLE COMPLETED 3 AUG 83

TOP OF HOLE
EL 361.5

FORT DETRICK, MD.
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA ☒
While drilling: Not encountered
24hrs after completion: Not encountered

	(a)	(b)	(c)	(d)
1.5	2	0.0	Yellow & dk yell. brn. sandy silty CLAY with rock fragments (CL) w/roots	
2.5	14			
4.0	3	2.0	Yellow-brn sandy CLAY w/rock fragments (CH)	
5.0	16			
6.5	4	34.4		
7.5	11			
9.0	2	38.2	Yellow-brown sandy SILT with rock fragments (ML)	
10.0	6			
11.5	1		9.5 Dk gray & yell. brn. silty clayey SAND w/rock fragments (SC)	
12.5	6	TOP OF ROCK		
12.9	100		12.0 A gray mixture of ROCK FRAGMENTS w/ sand (GP)	
13.1	44			
14.7	79		12.9 LIMESTONE, hard lt. gray beds to 0.4' with dark gray Shale seams to 0.1'	
16.1	100		Fractured and partly healed with calcite veinlets. Numerous weathered tan Shale seams to 15.7' also 1/4" weathered seams @ 16.3' & 16.5'	
17.4	100		Dip increases 30° to 45° below 15'	
18.2			18.2 BOTTOM OF HOLE	
			R&D not determined	

DH-3

HOLE COMPLETED 5 AUG 85

TOP OF HOLE

EL 359.9

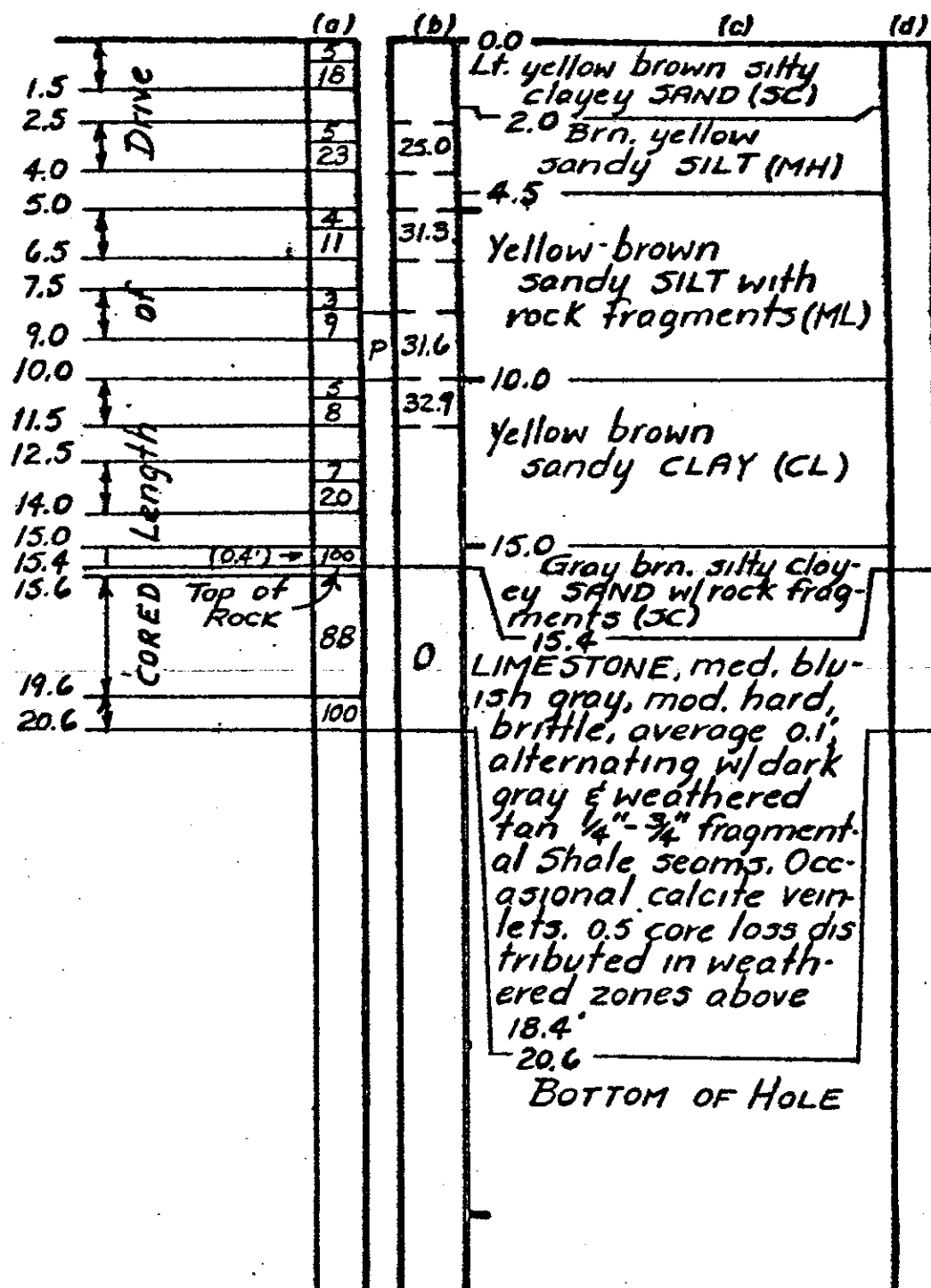
FORT DETRICK, MD.

FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA ▼

While drilling: Not encountered

Pressed Shelby tube sample (P) was obtained from an additional boring (DH-3A) put down adjacent to this hole



DH-4

HOLE COMPLETED 3 AUG 83

TOP OF HOLE

EL 361.4

FORT DETRICK, MD

FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA

While drilling: Not encountered

24 hrs after completion: Not encountered

Pressed Shelby tube sample (P) was obtained from an additional boring (DH-4A) put down adjacent to this hole.

	(a)	(b)	(c)	(d)
1.5	7	0.0	Brn. yellow silty clayey SAND w/ tr rock fragments (SC) w/ small roots	
2.5	18			
4.0	4	2.0	Yellow brown sandy CLAY (CL)	
5.0	9	27.3		
6.5	3	33.7	Yellow brown sandy SILT with rock fragments (ML)	
7.5	11			
9.0	8	P 28.5		
10.0	3	10.0	Yellow brown & gray silty clayey SAND with rock fragments (SC)	
11.5	17			
12.5	3	13.6	LIMESTONE, impure, Shaley, med. bluish gray with weathered tan streaks along 30° bedding joints through out and high angle joints 16.0'-16.5' & 17.0'-17.6'. Calcite vein 14.0'-14.2'; Clay Shale weathered fragmental to clayey 17.3'-17.6' & 19.4'-19.6'	
13.6	80 (0.6)			
14.9	77			
17.6	96			
18.0	63			
19.6				

DH-5

HOLE COMPLETED 4 AUG. 83

TOP OF HOLE
EL 361.1

FORT DETRICK, MD.
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA ▼
While drilling: not encountered

24hrs after completion: not encountered, hole caved

BOTTOM OF HOLE
RQD not determined

Pressed shelby tube sample (P) was obtained from an additional boring (DH-5A) put down adjacent this hole.

	(a)	(b)	(c)	(d)
1.5	22	0.0	Yell. brown & gray silty clayey SAND w/rock fragments & blacktop	
2.5	16			
4.0	5	1.5	Yellow-brn sandy silty CLAY (CL)	
5.0	14			
6.5	6	27.8	4.5 Yellow-brown sandy clayey SILT with rock fragments (ML)	
7.5	16	P 25.3		
9.0	3	28.5	7.0 Gray & yellow-brn. silty SAND w/rock fragments (SM)	
10.0	15			
10.1	75 (0.1)			
10.5	Top of Rock			
	ROCK BIT	37	10.1 LIMESTONE: hard solution worked & weathered along soft to friable shale partings thin-bedded. Lt gray and tan. Dip changes from 50° 10.1-15.0', from 60° to vertical-15.0'-17.1'; from 45° to 20° between 17.2' to 18.6'	
14.3	CORED	0		
15.3		90		
17.1		78		
18.6		87		
			BOTTOM OF HOLE	

DH-6

HOLE COMPLETED 4 AUG 83

TOP OF HOLE

EL 362.6

FORT DETRICK, MD.

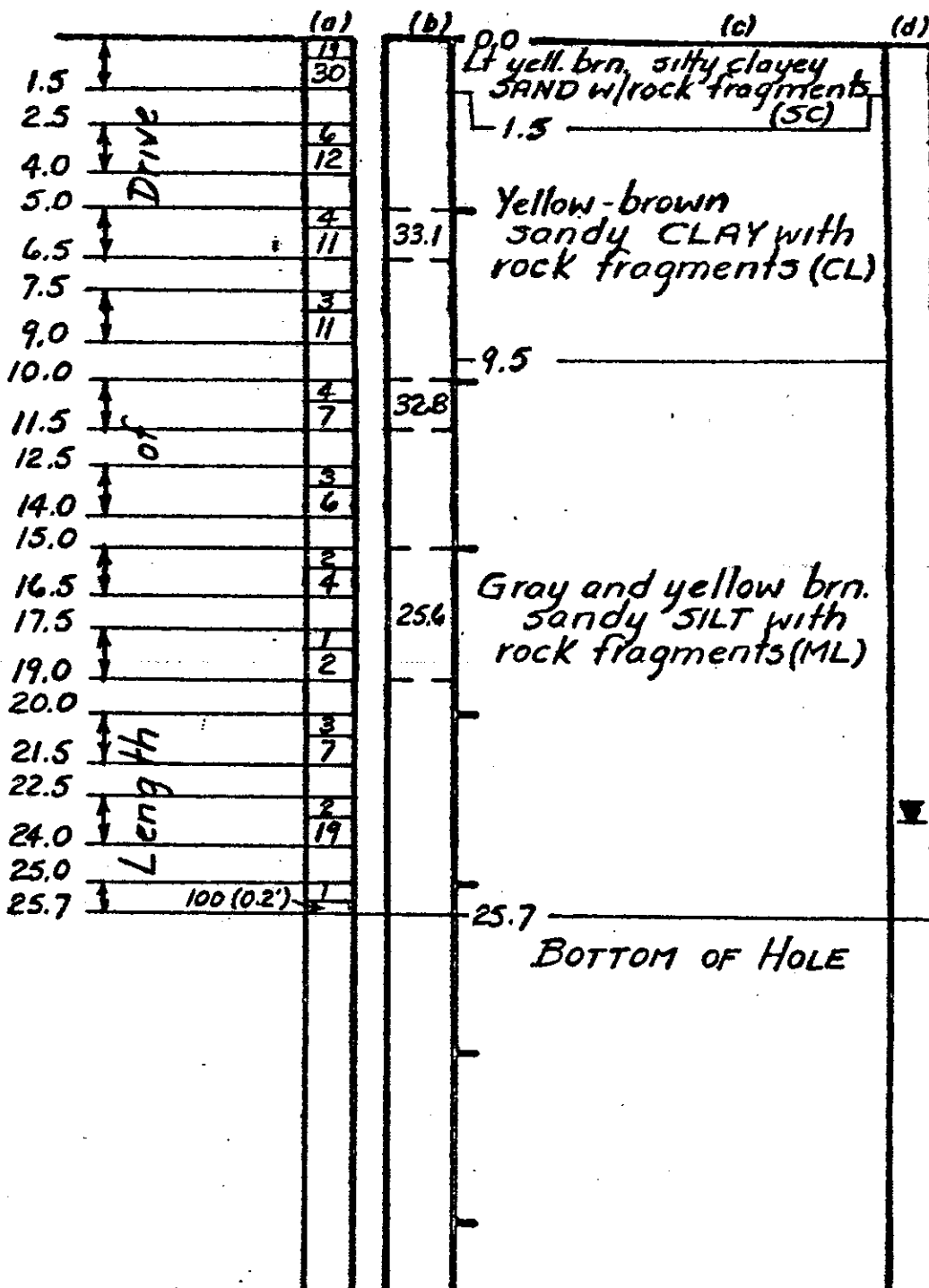
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA ▼

While drilling: Not encountered

24 hrs after completion:
Not encountered

Pressed shelly tube sample (P) was obtained from an additional boring (DH-6A) put down adjacent to this hole.



DH-7

HOLE COMPLETED 5 AUG 83

TOP OF HOLE

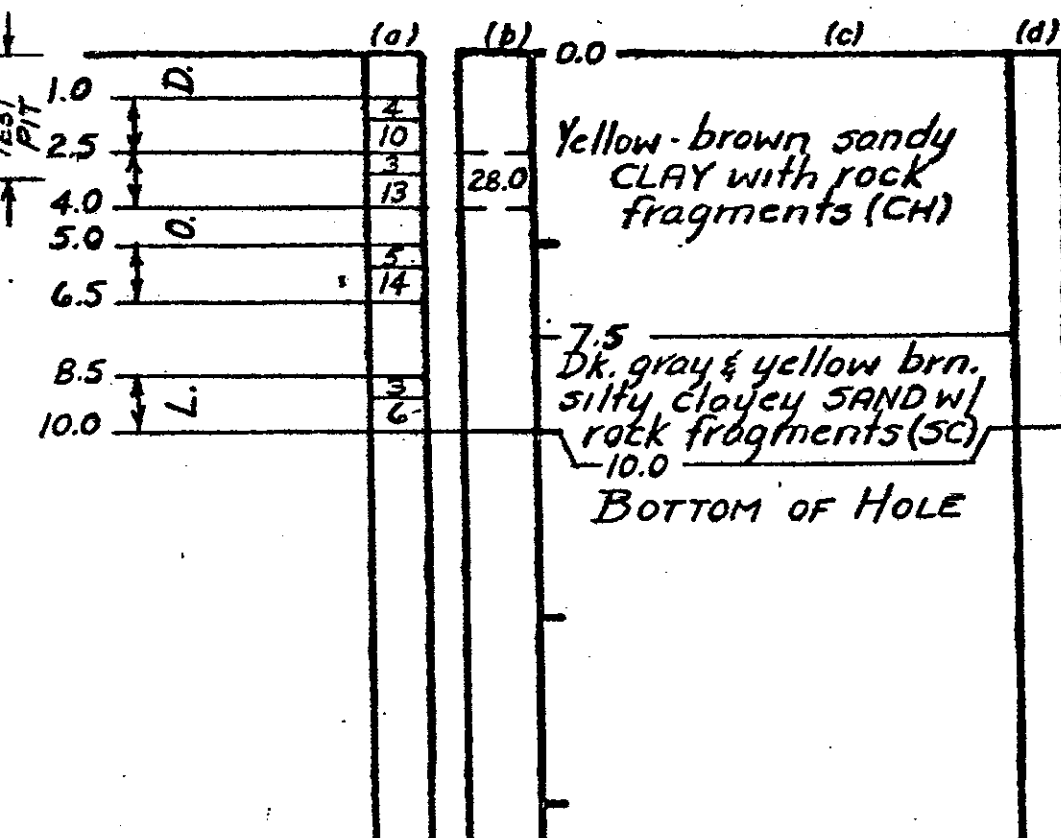
EL 361.6

FORT DETRICK, MD.

FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA ▼

While drilling: 23.0'



TP-8
DH-8

HOLE COMPLETED 27 JULY 83

TOP OF HOLE
EL 360.1

FORT DETRICK, MD.
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA ☒
Not encountered

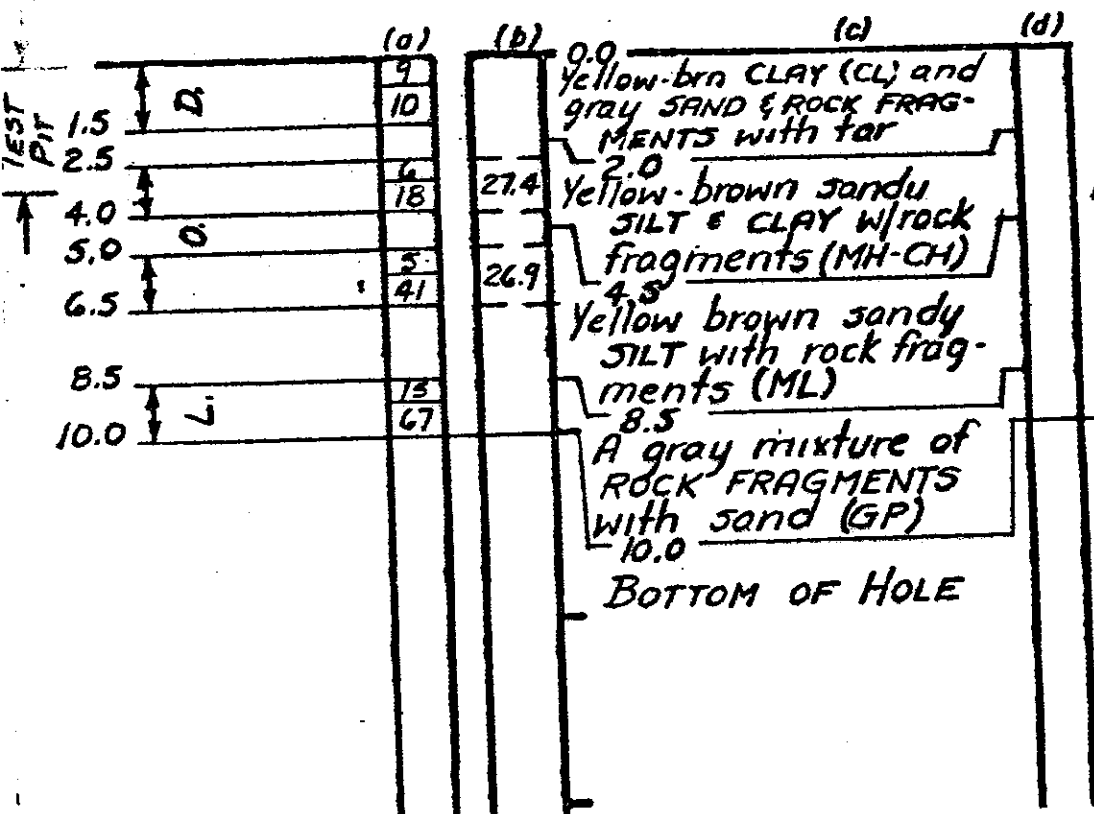
	(a)	(b)	(c)	(d)
1.0	9		0.0	
2.5	10			
4.0	13	24.6	Yellow-brown & red sandy CLAY with rock fragments (CL)	
5.0	4		5.0	
6.5	14	23.3	Yellow brn sandy SILT (ML)	
8.5	1		7.5	
10.0	4		Dark yellow brown sandy silty CLAY w/ tr. rock fragments and roots (CL)	
			10.0	
			BOTTOM OF HOLE	

DH-9
HOLE COMPLETED 27 JULY 83

TOP OF HOLE
EL 361.1

FORT DETRICK, MD.
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA **▼**
Not encountered



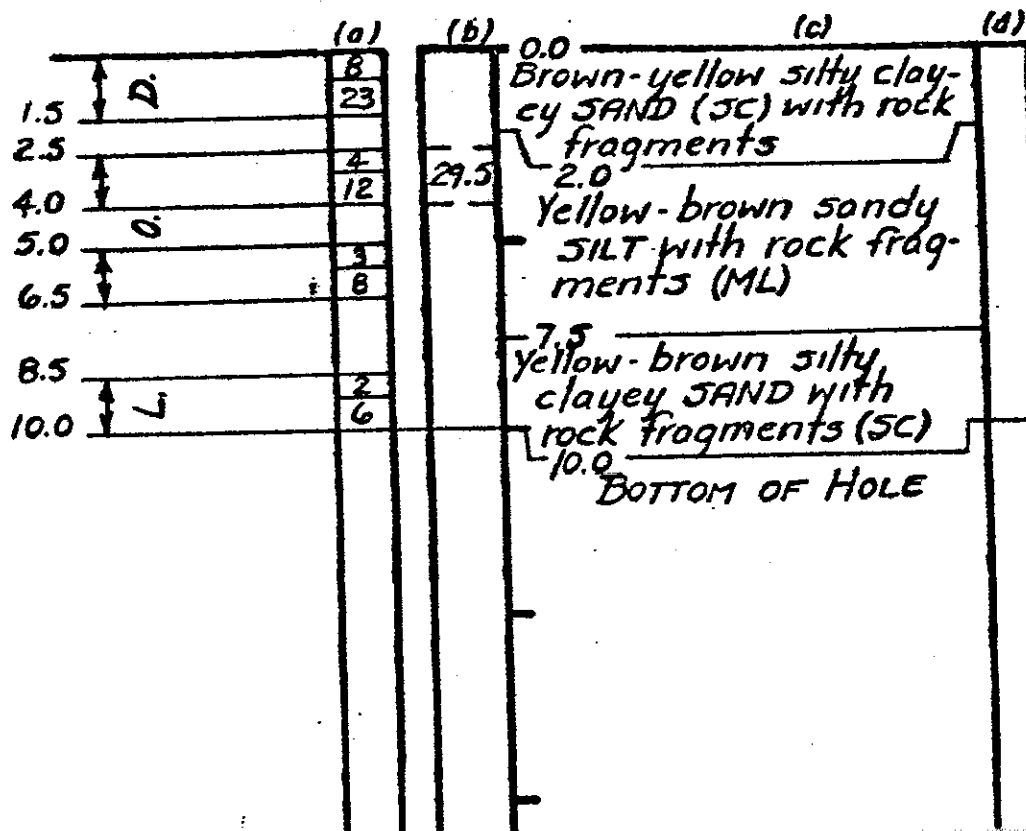
TP-10
DH-10

HOLE COMPLETED 27 JULY 83

TOP OF HOLE
EL 363.6

FORT DETRICK, MD.
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA ☒
Not encountered

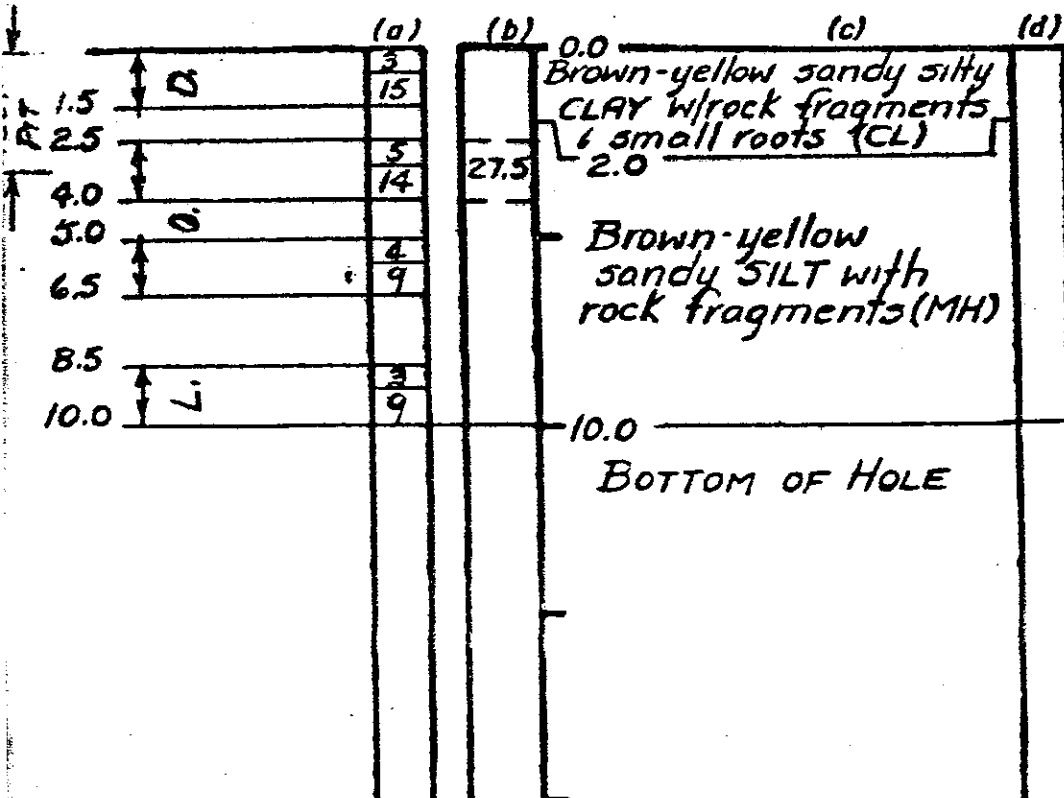


DH-II
HOLE COMPLETED 28 JULY 83

TOP OF HOLE
EL 363.9

FORT DETRICK, MD.
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA ▼
Not encountered



TP-12
DH-12

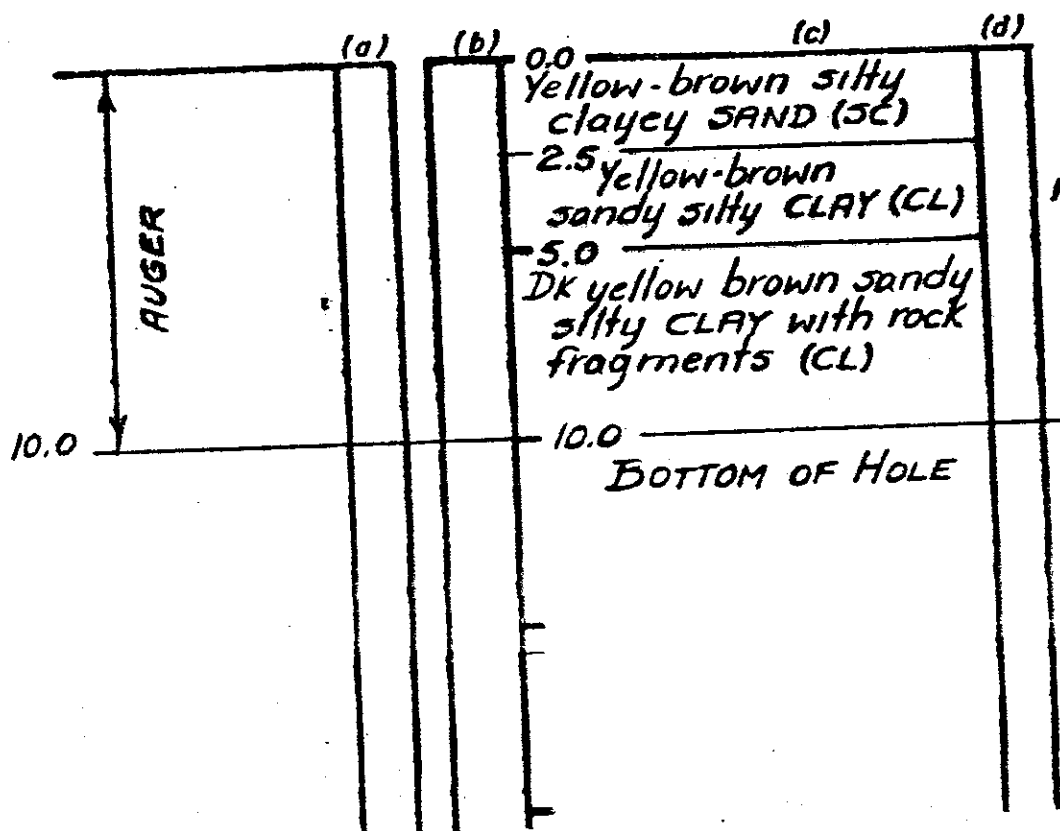
HOLE COMPLETED 28 JULY 83

TOP OF HOLE
EL 362.9

FORT DETRICK, MD.

FIRE STATION AND
SECURITY POLICE
BUILDING

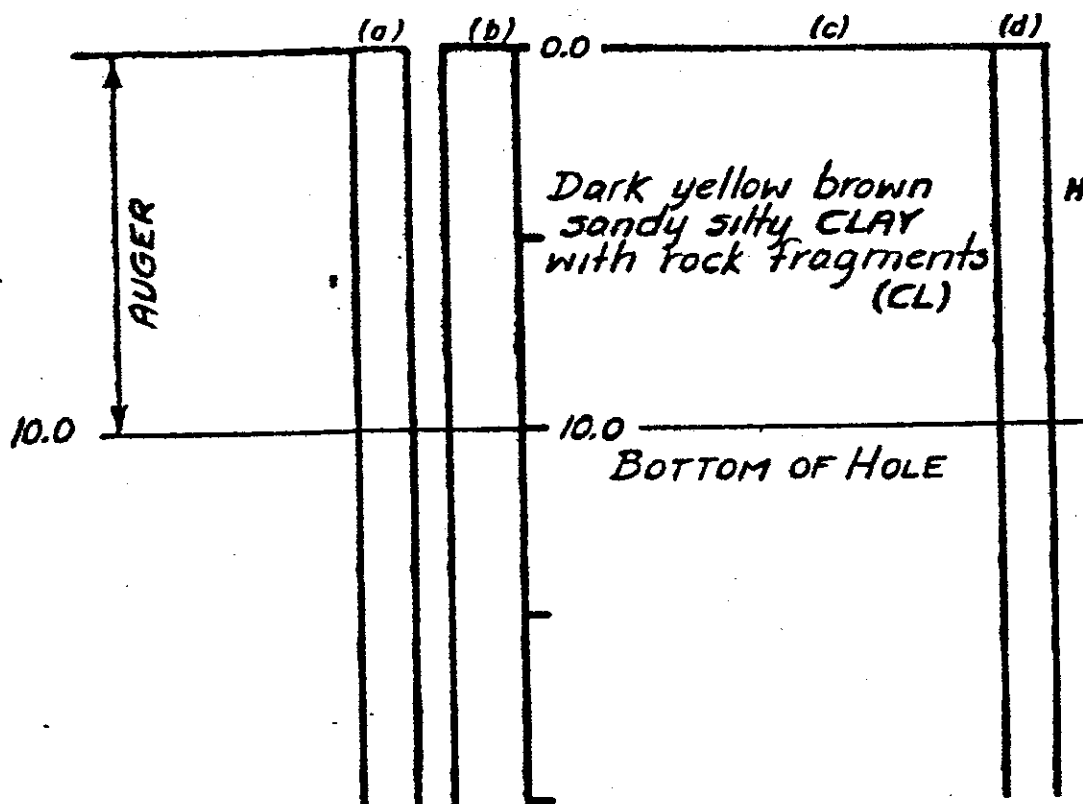
GROUNDWATER DATA ☒
Not encountered



AB-14
HOLE COMPLETED 27 JULY 83

TOP OF HOLE
EL 360.5
FORT DETRICK, MD.
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA ☒
Not encountered

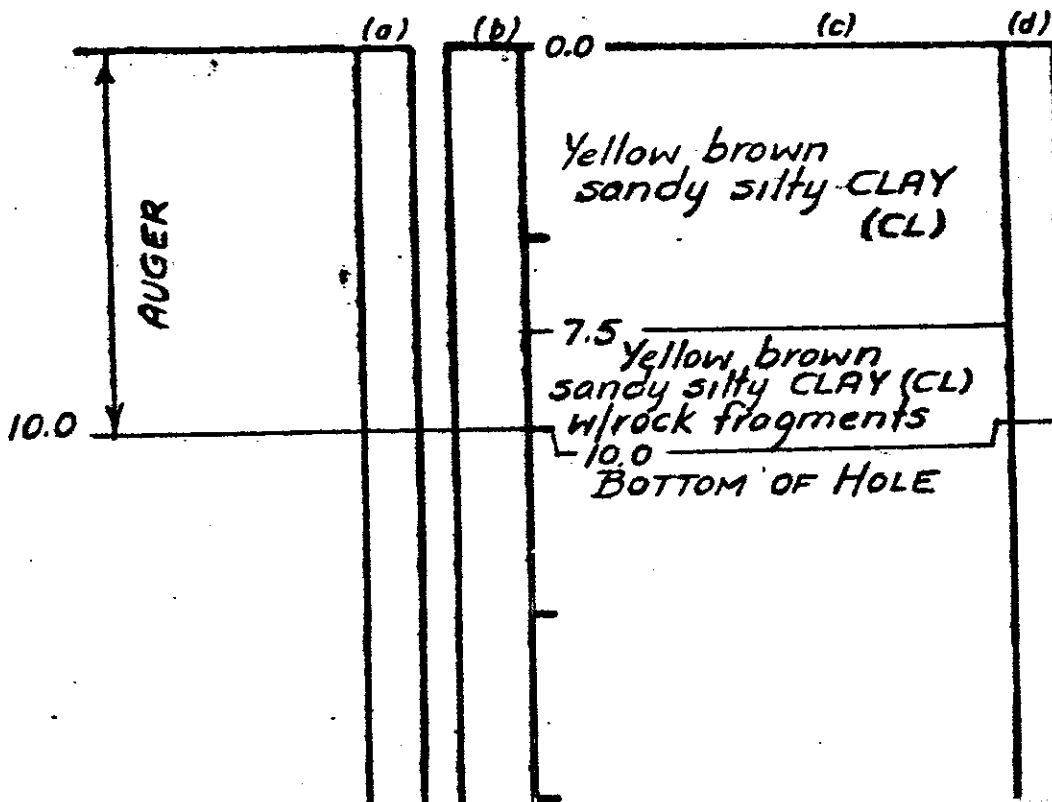


AB-15
HOLE COMPLETED 27 JULY 83

TOP OF HOLE
EL 357.2

FORT DETRICK, MD.
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA **V**

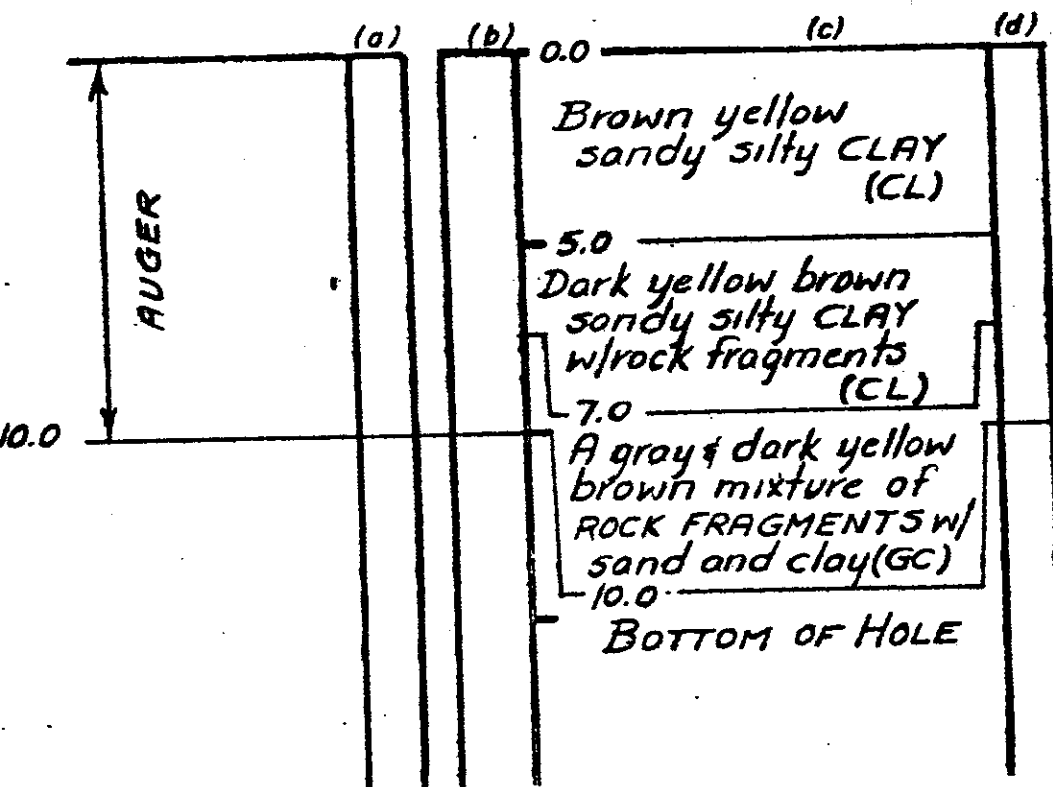


AB-16
HOLE COMPLETED 27 JULY 83

TOP OF HOLE
EL 355.6

FORT DETRICK, MD.
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA ▼
Not encountered

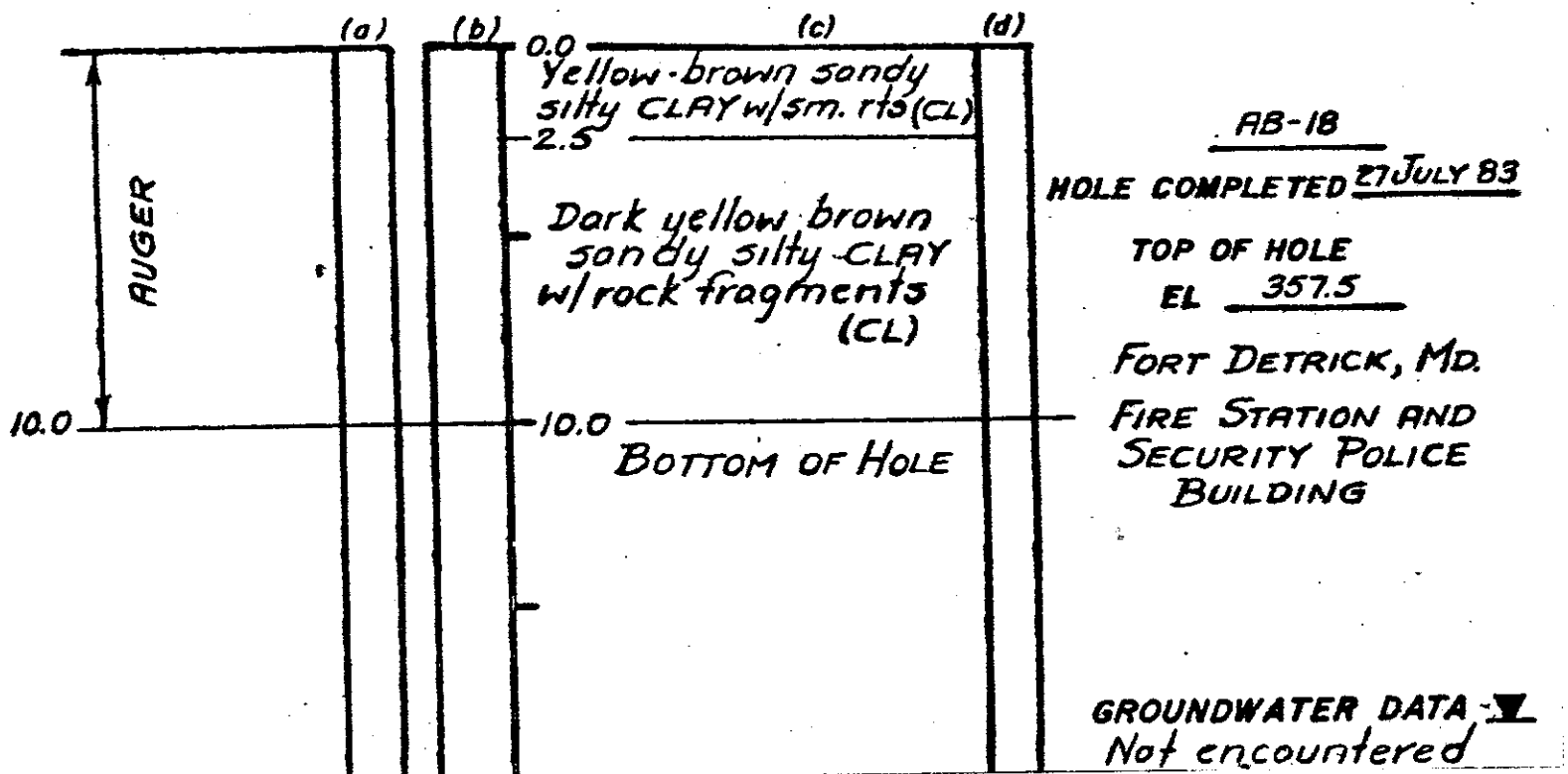


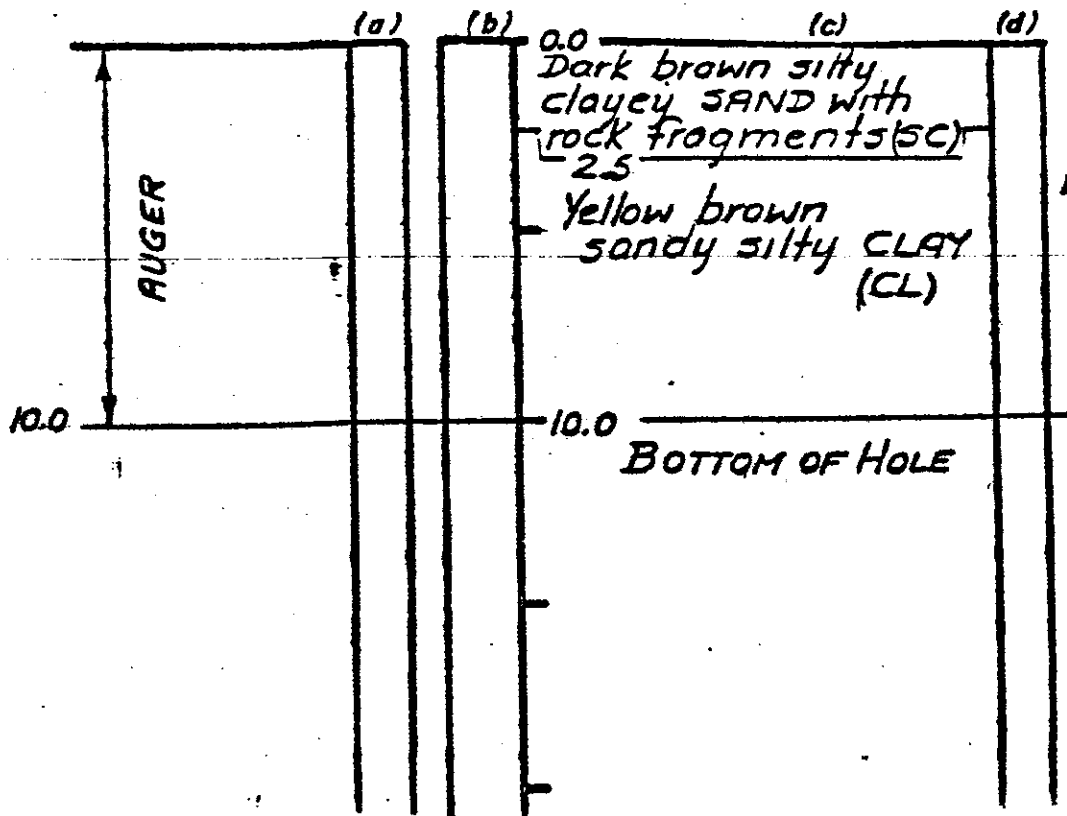
AB-17
HOLE COMPLETED 27 JULY 83

TOP OF HOLE
EL 360.4

FORT DETRICK, MD.
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA **V**





AB-19

HOLE COMPLETED 27 JULY 83

TOP OF HOLE

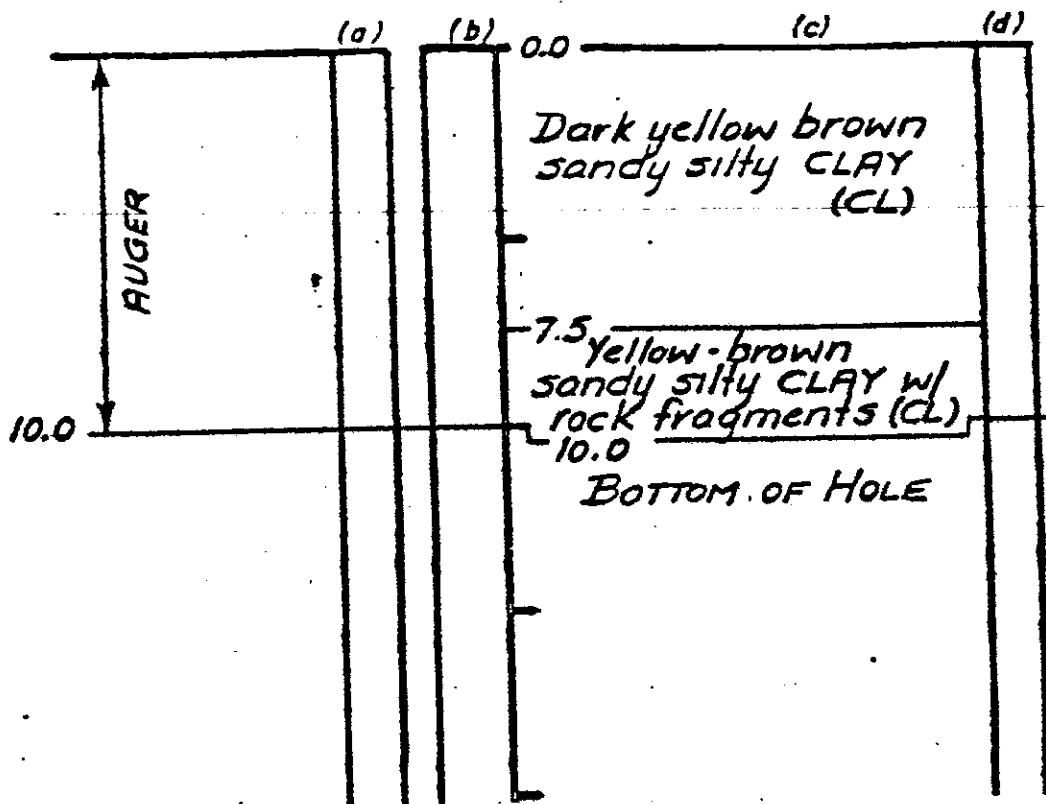
EL 358.6

FORT DETRICK, MD

FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA ▼

Not encountered



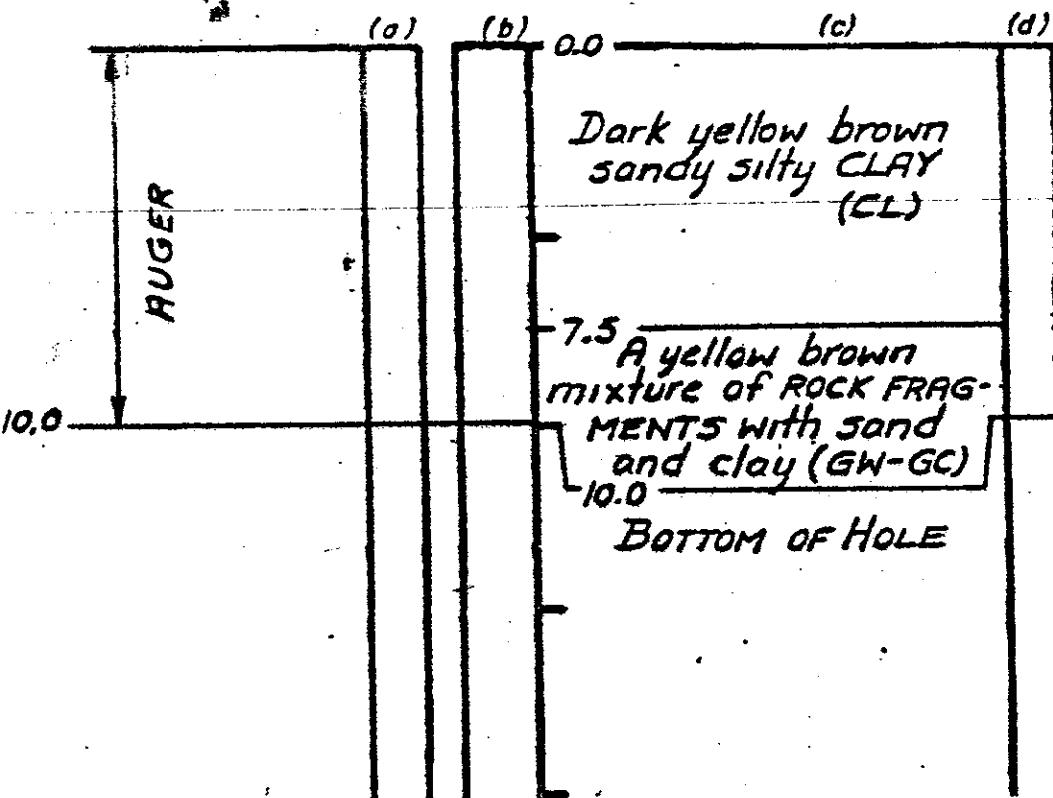
AB-20

HOLE COMPLETED 27 JULY 83

TOP OF HOLE
EL 359.3

FORT DETRICK, MD.
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA ▼
Not encountered



AB-21

HOLE COMPLETED 27 JULY 83

TOP OF HOLE

EL 359.2

FORT DETRICK, MD
FIRE STATION AND
SECURITY POLICE
BUILDING

GROUNDWATER DATA ☒
Not encountered

Fort Detrick Fire & Emergency Services

Apparatus Information

Unit	Year/Make	Model	Weight	Wheelbase	Length
Engine 501	1997 Pierce	1250 GPM Pumper	34,560 lbs	170"	27'4"
Engine 502	1994 Pierce	1250 GPM Pumper	34,800 lbs	174"	29'
Engine 503	1989 MACI	1000 GPM CFR	29,340 lbs	150"	25'
Hazmat 50	1989 E-One	18ft Squad Body	22,740 lbs	176"	27'4"
Utility 50	1999 Chev	Utility Body			
Car 50	1999 Chev	Suburban			
General Purpose	1997 Chev	Tahoe			
General Purpose	1998 Dodge	Durango			
Future		Ladder Truck	65,000 lbs	224"	40'

Project:

Location:

Design By: _____

Checked By: _____

SECTION 1: PAVEMENT DESIGN1. Strength Design: (Ref: TM 5-822-5 unless otherwise noted)

- a. Road Class = _ (Table 1 or 2 in TM 5-822-2)
- b. Traffic Category = ____ (Para 3-2a & b)
- c. Design Index = _ (Para 3-2c)
- d. CBR = ____ (Laboratory Test Results)
- e. Design Thickness = ____ inches (Fig. 8-1 - Flexible Pavement Design Curve for Roads Streets, Open Storage and Parking Areas.)

2. Frost Design: (Ref: TM 5-822-5)

a. Limited Subgrade Frost Penetration Method (LSFP): (NOTE: All quantities in parentheses are to be assumed if more exacting values are not known or are not available.)

- (1) Design Freezing Index = ____ (Fig 18-2)
- (2) Base Course Water Content = (4%)
- (3) Dry Unit Weight of Base = ____ pcf
- (4) Total Frost Penetration = a = ____ inches (Fig 18-3)
- (5) Surface Course Thickness = p = ____ inches (Table 6-1)
- (6) Base Thickness for Zero Frost Penetration into Subgrade C = a - p
= ____ inches
- (7) Ratio of Subgrade Water Content to Base Water Content = r = _
- (8) Design Base Thickness = b = ____ inches (Fig 18-4)
- (9) Subgrade Frost Penetration = s = ____ inches (Fig 18-4)
- (10) Design Thickness = b + p = ____ + ____ = ____ inches
- (11) Depth of Subgrade Preparation = $1/2(a) - (b+p)$ = ____ inches

b. Reduce Subgrade Strength Method (RSS):

- (1) Design Index = _ (from 1c above)
- (2) Soil Frost Group = ____ (Table 18-2)
- (3) Frost Area Soil Support Indice = ____ (Table 18-3)

(4) Design Thickness = _____ inches (Enter Fig. 8-1, Flexible Pavement Design Curve for Roads, Streets, Open Storage and Parking Areas with Frost Area Soil Support Indices as the abscissa)

(5) Depth of Subgrade Preparation = $1/2(a)$ - RSS Design Thickness = _____ - _____ = _____ inches

The frost design is controlled by either 2a(10) or 2b(4), whichever is less, but in no case will the pavement section be less than that required by the strength design. For this pavement the (RSS) (LSFP) method governs for the frost design.

3. Final Pavement Section: The final pavement design section will be the thicker of the Strength Design section (1) and the governing section for the Frost Design method (2). For this pavement, the (RSS) (LSFP) (STRENGTH) design provides the stronger section.

"BITUMINOUS CONCRETE (ROAD) (DRIVE) (PARKING AREA) PAVEMENT SECTION":

_____" Bituminous Concrete Wearing Course
Tack Coat
_____" Bituminous Concrete (Wearing) (Binder) Course
Prime Coat
_____" Dense Graded Aggregate (DGA) Base Course
_____" Rapid Drainage Material (RDM) Base Course
_____" Dense Graded Aggregate (DGA) Base Course

**SECTION 2: SUBGRADE AND SUBDRAINAGE REQUIREMENTS
FOR INCORPORATION INTO PLANS & SPECIFICATIONS**

1. Subgrade Preparation Requirements:

a. Compaction Requirements: (Ref: TM 5-822-5, Design Index = __, Table 4-1)

(1) COHESIVE SOILS: (Soils with PI > 5 and LL > 25)

Percent Compaction:	(Table 4-1) Depth Below Pavement Surface (inches)	Total Pavement Thickness (inches)	Req'd Depth of Subgrade Compaction to % Shown (inches)	Depth of Subgrade Compaction In-place (6" max)	Depth of Subgrade Removal and Recompaction (inches)
100%					
95%					
90%					
85%					
80%					

Total depth of cohesive subgrade removal & recompaction: _____

(2) COHESIONLESS SOILS: (Soils with $PI \leq 5$ and $LL \leq 25$)

Percent Compaction:	(Table 4-1) Depth Below Pavement Surface (inches)	Total Pavement Thickness (inches)	Req'd Depth of Subgrade Compaction to % Shown (inches)	Depth of Subgrade Compaction In-place (12" max)	Depth of Subgrade Removal and Recompaction (inches)
100%				---	
95%					
90%					
85%					
80%					

Total depth of cohesionless subgrade removal & recompaction: _____

(3) (In-situ CBR tests) (Interpretation of drilling data) indicate a natural subgrade density of approximately (___%) (85%) maximum laboratory density (ASTM D 1557, Method C). Since there (is) (is not) sufficient overlying base course and bituminous surfacing to meet the higher pavement compaction percentage requirements (90% to 100%), in-place compaction of the in-situ subgrade (will only be required to a depth of 6-inches.) (and its removal and recompaction will be required to the depths below pavement subgrade elevation as shown in the above tables for cohesive and cohesionless soils.)

b. Depth of Subgrade Preparation due to Frost Penetration : Refer to paragraph 3. [No subgrade preparation due to frost penetration is required since the governing frost design thickness plus its subgrade preparation depth is less than the strength design thickness.] [The governing frost design method is (RSS, para 2b(5), Section 1) (LSFP, para 2a(11), Section 1) with a required depth of subgrade preparation of ___ -inches. (The depth of frost penetration is small enough that special subgrade preparation is not necessary.) (Therefore, the subgrade needs to be excavated to a depth of ___ -inches, thoroughly mixed to insure a uniform blend of subgrade soils and recompacted. This blending of all subgrade soils types is necessary to insure uniform frost heave resulting from the penetration of frost into the subgrade soils.)]

c. Required Subgrade Preparation:Depth Below Pavement
Subgrade Elevation:(Refer to para 3, Section 1 &
para 1a & b, Section 2)Subgrade Earthwork Required

Removal/Replacement Of Subgrade Soils

Recompacted thickness of blended soils:

Recompacted thickness without blending:

Subgrade Compacted In-Place:

<u>Cohesive</u>		<u>Cohesionless</u>	
<u>Depth</u>	<u>%</u>	<u>Depth</u>	<u>%</u>
(in)	(*)	(in)	(*)

(* Note: Percentage of Laboratory Max Density ;ASTM D 1557, Method C.)

2. Subdrainage Requirements: The soils at the proposed construction sites are both frost susceptible and moisture sensitive. Therefore with the high in-place soil moisture contents and the high seasonally perched water conditions encountered at these sites, the subgrade soils will require a pavement subdrainage system. The subdrains will consist of a 6-inch minimum diameter pipe surrounded by a minimum of 3 inches of ASTM C33, #57 crushed stone on the bottom, 6 inches (minimum) on each side, and sufficient crushed stone above the top of the pipe to extend to the Rapid Drainage Material (RDM) Base Course within the pavement structure. The crushed stone filter material will be

completely enveloped in a filter fabric. Refer to Specification **Section 02710: SUBDRAINAGE** for filter fabric requirements.

3. SUBGRADE STABILIZATION NOTE : Subgrade stabilization is required in all paved areas. The stone stabilization layer, consisting of **[ASTM C33, #2 crushed stone]** **[RDM (#57) base course material]** shall extend a minimum of 5 feet beyond all edges of the paved areas. The Contractor shall remove any surface mud and place the stabilization fabric directly on the undisturbed subgrade. The fabric shall extend up to the top of the sidewalls of the excavation required to install the stone stabilization layer and a minimum of 2 feet beyond the top of the excavated area. If more than one roll width of fabric is required, overlap the two widths a minimum of 2 feet. Do not drive directly on the fabric. Back dump the stone stabilization material onto the stabilization fabric. Spread out the aggregate in the direction of any overlap of the fabric while maintaining a minimum of 12 inches of aggregate cover over the fabric at all times. All of the above work shall be done with tracked vehicles. Pneumatic-tired vehicles shall be kept to the minimum necessary to completely place the stone stabilization material on the stabilization fabric. The Contractor shall operate on the stabilization layer at all times and shall minimize contamination of the surface with mud, soil, or construction debris. If the top of the stabilization layer is no longer essentially free draining at the time of placement of the overlying pavement base course layers, the Contractor shall remove the top 6 inches within these areas and replace it with satisfactory stone stabilization material at no additional cost to the Government. "Free draining" shall mean that when a 1 gallon jug of water is poured slowly onto the surface of the stabilization layer, that quantity of water will drain through the surface within 1 minute; leaving a wetted surface area not greater than 1 square foot. Until the stabilization layers can be tied into the permanent subdrainage system, excavate temporary drainage trenches along the low end of the perimeter of the work areas to insure drainage of surface or subsurface water which collects in the stabilization layer. Refer to Specification **Section 02241: DGA AND RDM BASE COURSES** for stabilization fabric requirements.

Project:

Location:

Design By: _____

Checked By: _____

SECTION 1: PAVEMENT DESIGN

1. Strength Design: (Ref: TM 5-822-5 unless otherwise noted)

a. Road Class = _ (Table 1 or 2 in TM 5-822-2)

b. Traffic Category = ____ (Para 3-2a & b)

c. Design Index = _ (Para 3-2c)

d. Modulus of Subgrade Reaction = k = ____ pci (Based on Field Plate Bearing Tests) or (Based on Table 9-1 & Fig 9-1)

(1) If test results are not available, refer to para 9-4 and Table 9-1, Modulus of Soil Reaction, for typical values based on Unified Soils Classification System (USCS) soil classification symbol and on the in-situ moisture content of the soil. This yields a soil k -value = ____ psi.

(2) Read para 6-1a, Subgrade Conditions (Reinforced Concrete Pavements).

(3) When a base course is used, use Fig. 9-1, to determine the k -value on top of the base course; as a function of the base course thickness. This yields a k -value = ____ psi on top of the ____-inch base course. It is good practice to run field plate bearing tests to confirm this value.

e. Concrete 28-day Flexural Strength = ____ psi (based on local availability)

f. Pavement Thickness = ____ inches (Fig 12-1 or 12-2)

NOTE: Concrete pavement thickness shall be expressed to the nearest whole or half inch. Round up midway values. A minimum base course thickness of 4 inches is required for the strength design.

2. Frost Design:a. Reduced Subgrade Strength Method (RSS):

(1) Design Index = ____ (from 1c above)

(2) Concrete 28-day Flexural Strength = ____ psi (from 1e)

(3) Soil Frost Group = ____ (Table 18-2)

(4) The following is an iterative process whereby base course thicknesses are assumed and reduced moduli of soil reaction are determined. These values are used to determine the required pavement thickness. In no case should the reduced modulus of soil reaction exceed the value in 1d used for the

strength design. A minimum base course thickness of 4 inches is required, except for F3 and F4 subgrade soils where a minimum 8 inches of base course is required consisting of 4 inches of rapid draining material directly below the concrete underlain by a minimum of 4 inches of filter material over the subgrade soils (Ref. para 5-1 and 5-4).

<u>Trial Number</u>	<u>Assumed Base Course Thickness</u>	<u>Reduced Modulus of Soil Reaction (Fig. 18-5 of TM 5-822-5)</u>	<u>Pavement Thickness (Fig. 1 of TM 5-822-6)</u>
1	8.0" (min)	50	
2	12.5"	75	
3	17.0"	100	
4	21.5"	125	
5	25.5"	150	

(5) Pavement Thickness = ____ inches

(6) Base Course Thickness = ____ inches

NOTE: The values of 2a(5) and 2a(6) above should represent the least expensive combination of base course and pavement thicknesses shown in the table of 2a(4) above.

b. Limited Subgrade Frost Penetration Method (LSFP): (NOTE: All quantities in parentheses are values normally assumed when more exacting values are not known or are not available.)

(1) Design Freezing Index = ____ (Fig 18-2)

(2) $w = (4\%)$

(3) $\gamma = (135) \text{ pcf}$

(4) Frost Penetration = $a =$ ____ inches (Fig 18-3)

(5) Pavement Thickness = $p =$ ____ inches (From 1f above)

(6) $c = a - p =$ ____ - ____ = ____ inches

(7) $r = (3)$

(8) Design Base Thickness = $b =$ ____ inches (Fig 18-4)

(9) Design Thickness = $b + p =$ ____ + ____ = ____ inches

The frost design is controlled by either 2a or 2b, whichever is the least expensive. For this pavement the (RSS) (LSFP) method governs for the frost design.

3. The final pavement design is controlled by either the Strength Design (1) or by the Frost Design (2), whichever provides the stronger pavement section. For this pavement the (RSS) (LSFP) (STRENGTH) design provides the stronger section. However, if the frost design requires a greater pavement thickness than the strength design, the designer should contact the Facilities Engineer's Office to determine if a lesser thickness can be used based on past experience with similar pavements (similar traffic, similar groundwater conditions, similar soils, etc.) over a period of at least 10 winter seasons. In no case should the final pavement thickness be less than required by the strength design.

If a reduced thickness is used based on past experience with a similar pavement, a record of this experience must be included in this design analysis:

Name of Similar Road: _____

Traffic Conditions: _____

Road Class: _____

Traffic Category: _____

Soil Frost Group: _____

Approximate Groundwater Depth: _____

Description of Road's Condition: _____

Person Contacted for Above Information: _____

Person's Title: _____

EXTERIOR CONCRETE PAVEMENT SECTION:

_____" Concrete (____ psi flexural strength @ 28 days)
with ____" x ____" - W ____ x W ____ WMM placed ____" below the concrete
surface in the slabs shown to be reinforced on the drawings.
_____" RDM Base Course (Rapid Drainage Material)
_____" DGA Base Course (Dense Graded Aggregate)
[12.0" RDM (#57) Base Course {ASTM C33, #57 crushed stone
stabilization layer}
Geotextile stabilization fabric placed directly on the subgrade]

REINFORCING REQUIRED:

Odd Shaped Slabs: Exterior concrete access road will have odd-shaped slabs; therefore in accordance with para 13-1c(1), we need 0.1% steel:

$$.001 \times \text{___} " \times 12 "/' = \text{___} \text{ square inch steel per ft concrete}$$

USE ___ " x ___ " - W_ x W_ WWM yields: ___ square inch steel per ft of concrete
(closes common stock size)

Maximum Slab Length (Maximum Joint Spacing):

<u>Joint Spacing</u>	<u>Minimum percent steel (S%)</u>
<15'	0 - 0.1% (0 - 0.001)
15' - 25'	0.1% - 0.25% (0.001 - 0.0025)
25' - 40'	0.25% - 0.50% (0.0025 - 0.005)
>40'	0.50% (0.005)

S% (in decimal format) x ___ " x 12 "/' = square inch steel per ft of concrete
USE ___ " x ___ " - W_ x W_ WWM yields: ___ square inch steel per ft of concrete
(closest common stock size)

Reinforcing Around MH and Other Projections Through Pavement Surface : To minimize cracking around projections and to hold these cracks together, place the following additional reinforcing at the corners of all projections, with a min of 4 sets of bars around circular projections greater than 6 inches in diameter:

**2 No. 4 Reinf Bars, each 4 feet long, Spaced 4 inches apart.
Place bars at the mid-point of the slab**

Dowel Size and Spacing: (Ref Table 15-2)

___ -inch Dia. Bar, ___ inches long (min)
Spaced ___ inches (max) center to center.

SUBGRADE AND SUBDRAINAGE REQUIREMENTS:

Compaction Requirements : [In-situ (Plate Bearing) (CBR) tests indicate a natural subgrade density of approximately (___) (85)% CE55 maximum laboratory density.] [Consequently, compaction of the in-situ subgrade soil will **not** be required.] [To properly place the base course layers, a minimum of (6 inches of the in-situ cohesive subgrade soil shall be compacted to 90% Modified Proctor) (and) (12 inches of the in-situ cohesionless subgrade soil shall be compacted to 95% Modified Proctor) (and the following removal and recompaction will be required:

<u>Soil Type:</u>	<u>Removal Depth:</u>	<u>Modified Proctor Compaction:</u>
Cohesive	(6")	90%
Cohesionless	(12")	95%]]

Subgrade Stabilization Note: Subgrade stabilization is required in all paved areas. The stone stabilization layer shall extend a minimum of 5 feet beyond all edges of the paved areas. The Contractor shall remove any surface mud and place the stabilization fabric directly on the undisturbed subgrade. The fabric shall extend up to the top of the sidewalls of the excavation required to install the stone stabilization layer and a minimum of 2 feet beyond the top of the excavated area. If more than one roll width of fabric is required, overlap the two widths a minimum of 2 feet. Do not drive directly on the fabric. Back dump the RDM (#57) base course material onto the stabilization fabric. Spread out the aggregate in the direction of any overlap of the fabric while maintaining a minimum of 12 inches of aggregate cover over the fabric at all times. All of the above work shall be done with tracked vehicles. Pneumatic-tired vehicles shall be kept to the minimum necessary to completely place the RDM (#57) base course material on the stabilization fabric. The Contractor shall operate on the stabilization layer at all times and shall minimize contamination of the surface with mud, soil, or construction debris. If the top of the stabilization layer is no longer essentially free draining at the time of placement of the overlying pavement base course layers, the Contractor shall remove the top 6 inches within these areas and replace it with satisfactory RDM (#57) base course material at no additional cost to the Government. "Free draining" shall mean that when a 1 gallon jug of water is poured slowly onto the surface of the stabilization layer, that quantity of water will drain through the surface within 1 minute; leaving a wetted surface area not greater than 1 square foot. Until the stabilization layers can be tied into the permanent subdrainage system, excavate temporary drainage trenches along the low end of the perimeter of the work areas to insure drainage of surface or subsurface water which collects in the stabilization layer. Refer to Specification Section 02710 : SUBDRAINAGE for stabilization fabric requirements.

Subdrainage Requirements: The soils at the proposed construction sites are both frost susceptible and moisture sensitive. Therefore with the high in-place soil moisture contents and the high seasonally perched water conditions encountered at these sites, the subgrade soils will require a pavement subdrainage system. The subdrains will consist of a 6-inch minimum diameter pipe surrounded by a minimum of 3 inches of ASTM C33, #57 crushed stone on the bottom, 6 inches (minimum) on each side, and sufficient crushed stone above the top of the pipe to extend to the Rapid Drainage Material (RDM) Base Course within the pavement structure. The crushed stone filter material will be completely enveloped in a filter fabric. Refer to Specification Section 02710 : SUBDRAINAGE for filter fabric requirements.

**RIGID PAVEMENT DESIGN
(INTERIOR FLOOR SLABS)**

PROJECT: _____

LOCATION: _____ **DATE:** _____

Design By: _____ Checked By: _____

SCOPE: Design of concrete floor slabs-on-grade subject to vehicular loads and to high stationary live loads (loads imposed by movable items).

REFERENCE: TM 5-809-12, Concrete Floor Slabs-on-Grade Subjected to Heavy Loads.
TM 5-822-5, Pavement Design for Roads, Streets, Walks, and Open Storage Areas

NOTE: The use of this form does not preclude compliance with all requirements of TM 5-809-12 or TM 5-822-5.

I. NONREINFORCED STRENGTH DESIGN:

1. Traffic Volume(s):

a. Category of Traffic (page 3-1 & paragraph 3-2, Traffic Distribution).

b. Category	Largest Maximum Axle Load (kips)*	Maximum Load Capacity (kips)	Maximum Operations/Day
I	10	2 to 4	
II	15	4 to 6	
III	25	6 to 10	
IV	36	10 to 16	
V	43	16 to 20	
VI	120	20 to 52	

*Subsequent tables and design curves use these values to represent each category.

Note: Data from Facilities Engineer's office and the Using Agency.

2. Design Index:

a. Categories I, II, III: Design index = ____ (page 5-1, Table 3, Traffic Categories for Design Index. This table good for all Cat. I and II forklifts, but only up to 5 passes of a Cat III forklift; i.e., 25-kip max axle-load forklift.)

b. Categories III, IV, V, VI:

(1) No design indices: Separate curves for forklift max axle-loads of 25-kips and greater.

(2) Total design traffic: Total anticipated traffic volume is calculated for each max axle load forklift category over an anticipated 25-year life for the pavement.

$$\begin{aligned} \text{__-kip max axle load traffic} &= \text{__}/\text{day} \times \text{__ days/wk} \times \text{__ wks/yr} \times 25 \text{ yrs} \\ &= \text{_____ passes} \end{aligned}$$

$$\begin{aligned} \text{__-kip max axle load traffic} &= \text{__}/\text{day} \times \text{__ days/wk} \times \text{__ wks/yr} \times 25 \text{ yrs} \\ &= \text{_____ passes} \end{aligned}$$

$$\begin{aligned} \text{__-kip max axle load traffic} &= \text{__}/\text{day} \times \text{__ days/wk} \times \text{__ wks/yr} \times 25 \text{ yrs} \\ &= \text{_____ passes} \end{aligned}$$

$$\begin{aligned} \text{__-kip max axle load traffic} &= \text{__}/\text{day} \times \text{__ days/wk} \times \text{__ wks/yr} \times 25 \text{ yrs} \\ &= \text{_____ passes} \end{aligned}$$

3. Modulus of Subgrade Reaction (K) = ____ pci (Based on Field Plate Bearing Tests) or (Based on Table 2, TM 5-809-12 & Fig 9-1, TM 5-822-5.) (Equivalent K at top of ____-inch base course)

a. If test results are not available, refer to Table 2, Typical Values of Modulus of Subgrade Reaction, page 4-2, for typical values based on Unified Soils Classification System soil classification and on the in-situ moisture content of the soil. This yields a soil K-value = ____ psi.

b. Read para 5-3e, Non-uniformity (Subgrade), page 5-5: and para 5-5a, Subgrade Conditions (Steel Reinforcing), page 5-6..

c. When a base course is used, use Fig. 9-1, TM 5-822-5 (Jun 92) to determine the K-value on top of the base course; as a function of the base course thickness. This yields a K-value = ____ psi on top of the ____-inch base course.. It is good practice to run field plate bearing tests to confirm this value.

4. Concrete 28-day Flexural Strength (P) = ____ psi.

Based on compressive strength: $P = (7.5 \text{ to } 10) \times \text{SQRT}(\text{Compressive Strength})$

Ref: p.5, Design & Control of Conc Mixtures, PCA, 13th Edition

Use 7.5 to 8 for gravels and 9 to 10 for crushed stone.

$P = _ \times \text{SQRT}(\text{____ psi}) = _ \text{ psi.}$

5. Nonreinforced Pavement Thickness:

a. Theoretical nonreinforced pavement thickness (h_d) = ____ inches (to nearest 0.1 inch).

(1) Categories I, II, III: Design index curves, Figure 5-1, Design Curves for Concrete Floor Slabs, page 5-2. These curves are good for all Cat. I and II forklifts, but only up to 5 passes of a Cat III forklift; i.e., 25-kip max axle-load forklift.). This yields $h_d = _ \text{ inches.}$

(2) Categories III, IV, V: Design curves by Axle Load & Passes, Figure 5-2, Design Curves for Concrete Floor Slabs for Heavy Forklifts, page 5-3. This yields $h_d = _ \text{ inches.}$

(3) Design is based on greatest thickness required from design curves for design index and for Category III, IV, and V traffic.

b. Nonreinforced pavement thickness = ____ inches.

(NOTE: EIRS 78-04 Revision - Pavement Concrete. Thickness shall be expressed to the nearest whole or half inch. Round up midway values.)

6. Steel Reinforcement for Nonreinforced Concrete Slabs (for odd-shaped slabs, for slabs with mismatched joints, and where non-uniform subgrade support is a concern in frost regions.).

a. No reduction is allowed in pavement thickness for this reinforcement.

b. Minimum 0.06% distributed steel required in both directions (paragraph 5-5, Steel Reinforcement, pages 5-6 & 5-8).

$.0006 \times _ \text{ " } \times 12 \text{ " / ' } = _ \text{ square inch steel per foot of concrete}$

USE " x " - W x W WWM yields: ____ square inch steel per foot of concrete

(closest common stock size)

Maximum Slab Length (Maximum Joint Spacing):

<u>Joint Spacing</u>	<u>Minimum percent steel (S%)</u>
< 15'	0 - 0.1% (0 - 0.001)
15' - 25'	0.1% - 0.25% (0.001 - 0.0025)
25' - 40'	0.25% - 0.50% (0.0025 - 0.005)
> 40'	0.50% (0.005)

S% (in decimal format) x ____ " x 12"/' = square inch steel per ft of concrete

USE ____ " x ____ " - W ____ x W ____ WWM yields: ____ square inch steel per ft of concrete
(closest common stock size)

II. REINFORCED STRENGTH DESIGN:

1. Purpose: To increase the size of floor slab panels between joints or to decrease slab thickness requirements.

2. Graphic solution (nomogram):

a. Required thickness of nonreinforced floor slab to nearest 0.1 inch = ____ inches (h_d) (from step I5).

b. Desired thickness of reinforced floor slab = ____ inches (h_r) (6-inch minimum).

c. Nomogram: Page 5-9, Figure 5-4, Design Thickness for Reinforced Floor Slabs.

(1) Percent steel required = ____ (S, %)

(2) Maximum allowable length of reinforced pavement slabs = ____ feet (L) (25 feet minimum, 75 feet maximum).

$(S\%/100) \times h_r \times 12"/' =$ No. of square inches steel required per foot of concrete

____ x ____ " x 12"/' = ____ square inch steel per foot of concrete

USE ____ " x ____ " - W ____ x W ____ WWM yields: ____ square inch steel per foot of concrete
(closest common stock size)

Maximum Slab Length (Maximum Joint Spacing):

$L = \{0.00047 h_r (f_s S)^2\}^{1/3}$ Ref Eqn 5-2, para 5-7a(3)d, page 5-16, TM 5-809-12

$L =$ ____ ft say ____ ft where: $h_r =$ ____ " (reinf slab thickness)
 $f_s =$ 56,000 psi (steel yield strength)
 $S =$ % reinf steel
 $=$ (____ sq in per ft / ____ " x 12"/') 100%
 $=$ ____ %

III. FINAL PAVEMENT SECTION:

1. Interior Concrete Pavement Section:

____ " Concrete (____ psi flexural strength @ 28 days)
with ____ " x ____ " - W ____ x W ____ WWM placed ____ " below the concrete surface.
6-mil polyethylene sheeting (Vapor Barrier)
____ " RDM (#57) Base Course {AASHTO M43, #57 crushed stone }

Maximum allowable length of reinforced pavement slabs = ____ feet (L) (25 feet minimum, 75 feet maximum).

2. Reinforcing Around Bollards, Columns and Other Projections Through Pavement Surface: To minimize cracking around projections and to hold these cracks together, place the following additional reinforcing at the corners of all projections, with a minimum of four sets of bars around circular projections greater than 6 inches in diameter:

2 No. 4 Reinforcing Bars, each 4 feet long, Spaced 4 inches apart.
Place bars at the mid-point of the slab

3. Dowel Size and Spacing: (Ref Table 5-3, Dowel Size and Spacing, page 5-23)

____ -inch Dia. Bar, ____ inches long (min)
Spaced ____ inches (max) center to center.

IV. MAXIMUM ALLOWABLE STATIONARY LIVE LOAD:

1. Concrete floor slab thickness = ____ inches (from Step III-1a).
2. 28-day Flexural strength of concrete (P) = ____ psi. (from step I-4)
3. Stationary live load = ____ psf (Table 3-1, Maximum Allowable Stationary Live Load, page 3-3).
4. Modulus of Subgrade Reaction (K) = ____ pci. (from step I-3)

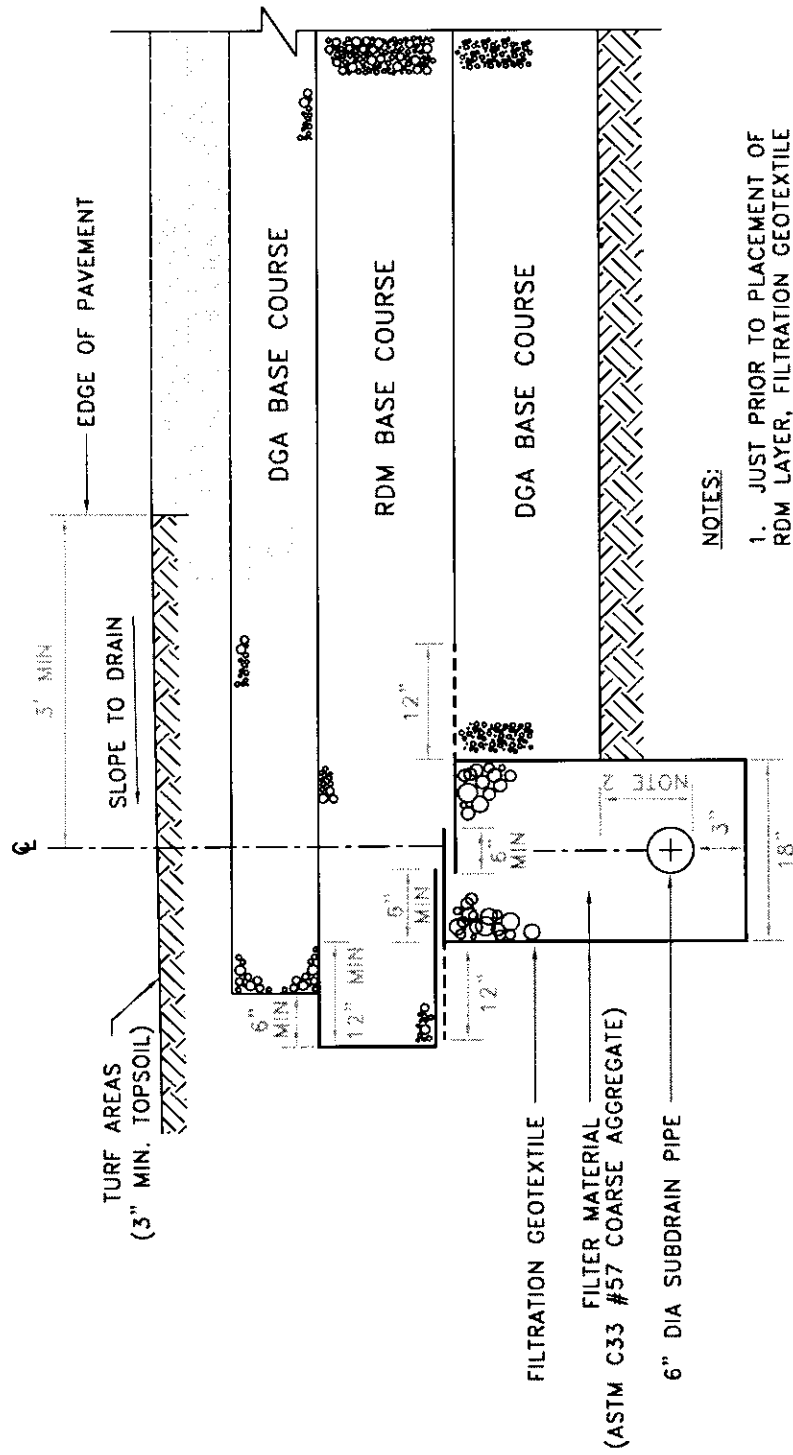
5. Constant factor = ____ (Table 3-1, page 3-3).

6. Maximum stationary live load = ____ x ____ = ____ psf
(Step IV3) x (Step IV5)

Note: The potential consolidation of underlying soils shall be evaluated to determine that no detrimental settlements will occur before specifying stationary live loads greater than 500 psf.

NOTE: SUBDRAIN SEQUENCE OF INSTALLATION:

1. PRIOR TO PAVEMENT CONSTRUCTION, INSTALL SUBDRAIN PIPE, FILTER MATERIAL, AND FILTRATION GEOTEXTILE UP TO BOTTOM OF BASE ELEVATION OR EXISTING GRADE, WHICHEVER IS LOWER.
2. LEAVE SUFFICIENT FILTRATION GEOTEXTILE AT THE TOP TO PERMIT THE FILTRATION GEOTEXTILE TO BE EXTENDED WHEN THE REMAINDER OF THE SUBDRAIN SYSTEM IS TO BE CONSTRUCTED. PROTECT ANY EXPOSED FILTRATION GEOTEXTILE WITH 6" COVER OF SAND UNTIL THE EARTH FILL AND/OR BASE IS PLACED AS REQUIRED TO REACH THE TOP OF SUBDRAIN ELEVATION.
3. CAREFULLY HAND TRENCH THROUGH FILL AND/OR BASE AS REQUIRED TO EXTEND THE SUBDRAIN SYSTEM TO THE LIMITS SHOWN.



NOTES:

1. JUST PRIOR TO PLACEMENT OF RDM LAYER, FILTRATION GEOTEXTILE AT TOP OF SUBDRAIN SHALL BE OPENED UP AND LAID BACK ON TOP OF THE UNDERLYING LAYER AS SHOWN. (SEE DASHED LOCATION)
2. VARIES SEE SHT ** & **,

RDM: RAPID DRAINAGE MATERIAL
DGA: DENSE GRADED AGGREGATE

PAVEMENT EDGE SUBDRAIN FOR BITUMINOUS PAVEMENTS

N.T.S.

CHAPTER 4 LANDSCAPE

4.0 LANDSCAPING

4.1 GENERAL

The landscape plan shall be designed in accordance with the Fort Detrick Installation Design Guide (IDG). The final landscape plan shall have all plants and site furnishings labeled. Provide a plant schedule with plant quantities, common and botanical plant names, plant sizes and spacing of plants. Provide tree and shrub planting details, edging detail, tree protection, and site furnishings details or cut sheets. A soil test shall be performed for pH, chemical analysis and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of trees, shrubs and grassing. Landscaping and Grassing (Seeding and Sodding) specifications shall also be provided with the final design. The plant specifications shall include a two-year warranty or a warranty until the beneficial occupancy date; whichever is longer, for the replacement for all plants. The landscape specification shall use all of the pertinent plant standards in ANSI Z60.1. It shall also include maintenance (watering, weeding and plant replacement) of all plant materials. This maintenance shall continue until the beneficial occupancy date has occurred. The contractor shall also provide a maintenance manual for the user with specific information on caring (watering, pruning, fertilizing and weeding beds) for all of the new plantings.

4.2 LOCATION AND SETTING

4.2.1 This project is an expansion and renovation of an existing Fire Station at Fort Detrick, Maryland. Site planning and landscape design shall be focused to meet the Ft. Detrick design emphasis of an open park-like setting. The landscape design will follow Ft Detrick landscape guidelines and conceptual plans for streetscapes utilizing several landscape features.

4.2.2 Plant materials (trees and shrub groupings) shall be utilized to accent and define the building and site areas, and buffer visually unattractive elements. Plant materials shall be selected for low maintenance and aesthetics. Trees shall be utilized in accordance with the IDG objectives. Tree species selected shall be fast growing providing shade in a few years.

4.3 PLANTING DESIGN

4.3.1 Planting design is to be compatible with the surrounding environment. Emphasis shall be given to preserving as much of the existing plant material as possible. It is preferable to save groupings of trees with under story plants rather than individual trees. The only trees to be removed are those in conflict with the proposed building, pavement, utilities and walkways. Tree protection fencing shall be used around trees being saved at their drip line. Emphasis shall also be given to using trees and shrubs that are native, hardy and low maintenance. Group plants of similar water requirements together. The Ft. Detrick point of contact for planting design questions and information is Ms. Betty Boyland, Natural and Cultural Resource Manager, 1500 Porter Street, (301) 619-2033.

4.3.2 Provide a foundation planting for the facility, which includes groundcovers, shrubs and small ornamental trees. Provide metal edging around beds in accordance with IDG.

4.3.3 Provide extensive shade trees and sound buffers, and screen visible utility enclosures and dumpster enclosures. For screening use only plant materials. Use large size plant material; a minimum of 1.5 to 2.0 inch caliper for deciduous trees, a minimum of 5.0 to 6.0 feet high for evergreen trees and a minimum of 18 inches high for deciduous and evergreen shrubs. Allow for adequate access clearance in shrub screen around chillers, transformers, and switches. To prevent hazard to vehicles and pedestrians, landscape materials shall not block vehicular sightlines at entries and exits along roadways and parking lots.

4.3.4 Planting material shall be non-toxic species, thorn-free, non-allergenic and not prone to large limb breakage.

4.3.5 Provide for reforestation of not less than 0.7 acres within the limits of disturbance provided.

4.4 TREES

4.4.1 To satisfy requirements of the Maryland Department of Natural Resources (DNR) Forest Conservation Act, the Contractor shall coordinate with the Ft. Detrick, USAG, Environmental Office, (EMO) in developing a reforestation plan. The point of contact is Ms. Betty Boyland at (301) 619-2033. Ms. Boyland will have full approval authority for the Forest Conservation Act reforestation plan. The Contractor will be required to plant trees to cover an acreage equal to 20% of the disturbed site. Trees shall be planted on site as part of the site layout plan if possible. If additional acreage is needed, the EMO will designate another site on the post where trees may be planted. Plantings will be in accordance with the following criteria.

4.4.2 All reforestation areas will be in a forest and not a riparian setting. Trees to be planted in a reforestation areas shall be native and include but not be limited to the following in these approximate proportions. Scarlet oak (10%), white (10%), southern red oak (5%), red maple (10%), white ash (10%), pignut hickory (5%), black gum (5%), tulip poplar (5%), walnut (5%), beech (5%), pitch pine (5%), Norway spruce (10%) american holly (5%), red bud (5%), and serviceberry (5%). Site planting rate shall be at one of the following densities: 100 - 2" caliper trees/acre (20' x 20' spacing); 200 - 1" caliper trees/acre (15' x 15' spacing); 350 - ½" caliper trees/acre (11' x 11' spacing). Refer to the Maryland Forest Conservation Manual, Forest Conservation Plan, Reforestation and Afforestation Procedures for further guidance. All trees shall conform to the American Standards for Nursery Stock, and planted in accordance with Acceptable Planting Standards.

4.4.3 All trees shall be under warrantee by the Contractor for two year from initial acceptance at which time they shall be in a healthy and vigorous condition.

4.5 TREE PLANTING

All trees shall be staked. No bare root trees shall be used. Only container and/or ball and burlap trees shall be used. The new tree-planting hole shall

be 3 times the width of the tree's root ball. Provide an extra spaded area 8" in depth and 12" wide on either side of the planting hole. A 4" high water saucer shall be placed around the root ball of each tree. All planting holes and spaded areas shall be mulched with a 3" depth of new pine straw. Accurate watering amounts and schedules shall be provided in the contractor's specification. Backfill shall be the site's native topsoil. All deciduous trees shall have a protective covering around the trunk to prevent damage by deer.

4.6 SHRUBS

All shrubs shall be predominately native, non-toxic and thorn free. Shrubs shall be the following minimum size: for ground covers use 1 or 2 gallons, for small shrubs use a minimum size of 3 gallon container, and 7 gallons for the large shrubs. 15 gallon shall be for the large specimen shrubs. Shrub and ground cover beds shall be provided with a hard edging consisting of a minimum of 5"x1/8" steel or aluminum edging (painted black), brick set in concrete or a concrete curbing. Topsoil shall be used for shrub and groundcover backfill and planting. All shrubs shall be under warrantee by the Contractor for one year from initial acceptance at which time they shall be in a healthy and vigorous condition.

4.7 GRASSING (SEEDING AND SODDING)

Turf type seeding or sodding shall be provided for all disturbed and bare areas, which are not paved or otherwise, landscaped. All seeded areas shall be mulched on the same day as seeding. Accurate watering amounts and schedules shall be provided in the contractor's specification. Grass species required shall meet local growing conditions. Confirm with local Agricultural Extension Service, State Agricultural Experimental Station, local university, Turfgrass Producers International (TPI), or other reputable source to determine/verify: species selection, establishment season; seeding and sodding installation procedures; application rates for the soil amendments; and other installation requirements particular to the project area.

4.8 GRASSING (SEEDING AND SODDING) SPECIFICATIONS

4.8.1 Seeding and sodding specifications shall be developed by the contractor for use in this project. A minimum of 2" of topsoil shall be provided for all seeded and sodded areas. Reference Section "TOPSOIL".

4.8.2 "Permanent" Seed Classification shall be State-Certified seed of the latest season's crop provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with AMS-01 and applicable state seed laws. "Permanent" Seed Quality shall conform to FS JJJ-S-181. Weed seed shall not exceed 1 percent by weight of the total mixture. Wet, moldy, or otherwise damaged seed shall be rejected.

4.8.3 "Temporary" Seed Classification shall be State-Certified seed of the latest season's crop provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with AMS-01 and applicable state seed laws. "Temporary"

Seed Quality shall conform to FS JJJ-S-181. Weed seed shall not exceed percent by weight of the total mixture. Wet, moldy, or otherwise damaged seed shall be rejected.

4.8.4 Sodding shall be State-Certified. Delivered sod shall have been cut not earlier than the previous day, and shall be delivered on the day it is to be installed. Storage of sod is not permitted. Sod shall be relatively free of thatch, diseases, nematodes, soil-borne insects, weeds or undesirable plants, stones larger than 1 inch in diameter, woody plant roots, and other materials detrimental to a healthy stand of grass plants. Broadleaf weeds and patches of foreign grasses are not permitted. Sodding shall be installed from March 15 to May 1 for spring establishment; and from Sept 15 to Dec 1 for fall establishment. Where slopes are 3:1 or steeper, provide sod in lieu of seeding or seeding covered with a standard straw erosion control mat.

4.8.5 "Until the beneficial occupancy date the sod and seeded areas shall be watered, maintained and where needed replaced. The grass sod and seeding warranty shall be for a satisfactory stand of grass for 30 days after completion. If the beneficial occupancy date is beyond the 30 days then the warranty shall continue until that date. An acceptable stand of grass for sodding is a solid grass cover with no gaps. For seeding it is not less than 20 seedlings of permanent grass at least 2 inches long in each square foot with no gaps larger than 4 inches.

4.8.6 Soil amendments shall be determined by performing a soil test and meeting local growing conditions on the project site.

4.9 TOPSOIL

Topsoil used in grassing and planting of shrubs, ground covers and trees shall be the saved topsoil from the site. It shall have a one (1) percent minimum organic content and a pH of 4.5 to 6.0. It shall be free of subsoil, brush, weeds, stones, roots, stumps, or any other substance that might harm plant growth. If the stored site's topsoil is not sufficient to cover the landscaping needs, additional topsoil which is free from any invasive species seeds or plants, shall be provided by the contractor from an approved off site source. The approval shall be by the contracting officer with assistance from the local Soil Conservation Service (USDA).

4.10 TREE PROTECTION

Existing trees, both individual and groups to be saved shall be protected with wooden tree protection fences. These shall be installed before any earthwork occurs and shall be maintained and repaired when damaged. These shall remain in place until after all the landscape work is completed. The fences shall be placed no closer than the dripline of the trees. The fence shall be made out of 4x4 posts set no further than 8' apart and shall have a 2x2 top rail. The height shall be a minimum of 4'. No excavation, filling, trenching for utilities or storage of materials shall be allowed within these tree-protected areas. If there is bare earth under these existing trees a 3" layer of mulch shall be added to cover the area within the tree fence.

4.11 SITE FURNITURE

Site furniture recommended by the IDG shall be utilized. Site furnishings will be used as functional accents and to create visual interest throughout the project area.

4.12 EXTERIOR BUILDING NAME SIGNS

Exterior building name signs shall be provided and installed in accordance with the IDG and comply with the standards provided in the Department of the Army Technical Manual 5-807-10. The building name shall be coordinated with the Contracting Officer's representative.

CHAPTER 5

ARCHITECTURAL

5.1 ARCHITECTURAL

5.2 GENERAL INFORMATION

5.2.1 Construction for the Fire Station Addition shall be based on the information contained in this Request for Proposal (RFP) and the attached conceptual floor plan at the end of this section as Attachment 1.

5.2.2 Information gathered during site visits and the pre-design conference meeting with the Fire Station personnel were used to discuss the floor plan layout and functional requirements.

5.2.3 Architectural features of this facility shall be designed in accordance with the Fort Detrick Installation Design Guidelines, which is included in Appendix A, after Chapter 10. The exterior shall be designed to incorporate the style, color and materials of other recent facilities in the area. All materials will be chosen for durability and low maintenance. Materials and finishes noted in this RFP should be considered as minimum requirements. Improved finishes or betterments are encouraged.

5.2.4 This facility shall be constructed in accordance with Military Handbook 1008C. MIL HDBK 1008C currently requires new buildings to be either Type I or Type II construction as determined by the Uniform Building Code (UBC). In accordance with EC 1110-1-94, CLASSIFICATION OF TYPE OF CONSTRUCTION, this Engineering Circular (EC) modifies MIL-HDBK 1008C to allow any type of construction, as long as it complies with the UBC requirements for determining construction type. Where there is a case of conflicting requirements the most stringent requirement shall apply. Military Handbook 1008C references: a) applicable portions of the Uniform Building Code for the following: type of construction, fire resistance requirements, allowable floor area, building height limitations, and building separation distance requirements; and b) building construction related to egress and safety to life shall comply with NFPA 101. Type of occupancy shall be in accordance with UBC and NFPA. Fire Resistant plywood is not permitted as a roof sheathing material. Finishes shall be Class A or B except that smoke spread rating cannot exceed 100 for Class B.

5.2.5 Antiterrorism/Force Protection (AT/FP): The facility shall be designed in accordance with Interim Department of Defense Antiterrorism/Force Protection Construction Standards. A copy of this document will be made available to the Contractor.

5.2.5.1 Antiterrorism/Force Protection Construction Standards and shall include but not be limited to controlling access to roofs, for insulated glass use a minimum of 1/4" (6 mm) annealed laminated glass for the inner pane, exterior doors shall use a minimum 1/4" (6 mm) annealed laminated glass, and attaching interior ceiling mounted fixtures to the supporting structural system which includes suspended ceilings, light fixtures, and mechanical and electrical ducting and pipes, etc. See the Interim Department of Defense

Antiterrorism/Force Protection Construction Standards, December 16, 1999 for additional requirements.

5.2.5.2 A minimum ten-meter standoff zone has been established around the building, and access to parking areas and driveways within the zone is restricted to authorized vehicles. Hardening standards will have to be met for the building, especially along Porter Street, where additional space for increase standoff distance is not available. Replacement windows that meet AT/FP criteria are proposed for the entire building. A vehicle spike strip is proposed to prevent unauthorized access from Porter Street to the exit drive for the apparatus bays. A gated access drive behind the building provides restricted access to Fire Department and PMO employee parking spaces.

5.2.6 Project Phasing: Fire Station and PMO must be fully operational at all times during construction. The fire personnel will be required to be relocated to temporary facilities with sleeping accommodations and toilets during interior demolition and renovation of existing space. Fire apparatus vehicles will also require appropriate measure for temporary and secure parking that will not interfere with required fire response time. New expansion and renovation will have to be structured within the contractors work plan. Reference Section 2.4.3. Temporary Facilities for Fire Station Personnel, for coordination of temporary personnel facilities needed to maintain facility operation. Conceptual Site Plan presents information discussed with fire personnel and alternate solutions presented by contractor are encouraged.

5.2.7 Existing Building Background and Organization: The following is a discussion of Building 1504 existing conditions and organizational deficiencies:

5.2.7.1 Building 1504 is home to Fort Detrick one-company Fire Station and the Provost Marshal's Office and Police Station. The original fire station encompasses approximately 6,500 gross square feet (GSF), which includes a high bay apparatus room for two trucks and a one-story administrative/sleeping area. Two additions have since expanded the building to accommodate the requirements of a two-company fire department. In 1985-86, a two-story addition at the rear of the building provided a physical training room, training room and additional bunk space. In 1998-99, a two-vehicle apparatus room was added to the southwest corner of the building, adjacent to the original apparatus room.

5.2.7.2 The mission of the fire department has been expanded due to two additional responsibilities that require additional apparatus space. The closure of Fort Ritchie has required two trucks alternate being kept at Fort Detrick to "dry out". Also, Fort Detrick is responsible for HAZMAT response and rescue support for Fort Detrick as well as Frederick County.

5.2.7.3 The four existing bays in Building 1504 do not accommodate all of the assigned vehicles. Overflow equipment is parked outside on the driveway and one truck is stored off-site in Building 938. In addition, a new 50-foot HAZMAT truck is expected in the future and the existing apparatus bays do not dimensionally accommodate this equipment.

5.2.7.4 The original Building 1504 Fire Station was programmed and designed prior to the publication of the USACE Design Guide for Fire Stations (DG 1110-3-145, March 1986). Original building and the following two additions do not conform to the Design Guide criteria.

5.2.7.5 This project has been coordinated with the installation physical security plan, and all required physical security and Antiterrorism/Force Protection (AT/FP) measures are included.

5.2.7.6 See Section 5.4 for a detailed listing of all personnel, rooms, spaces, areas, and equipment and Attachment 1 for conceptual floor plan (following Chapter 5).

5.3 REFERENCES:

Design shall meet the latest edition of the following criteria unless otherwise noted herein:

MIL-HDBK-1008C, "Fire Protection for Facilities, Engineering, Design, and Construction".

EC 1110-1-94, Dated 31 July 2001, Modifying MIL-HDBK-1008C.

MIL-HDBK-1190, "Facility Planning and Design Guide".

Conceptual Site Plan, see attachment 1 following Chapter 2.

Conceptual Floor Plan, see Attachment 1 following Chapter 5.

Installation Design Guide, Attached as Appendix A.

Uniform Federal Accessibility Standards (UFAS), 49 CFR 31528.

Americans With Disabilities Act (ADA), Public Law 101-336.

Americans with Disabilities Act Accessibility Guidelines (ADAAG), 36 CFR Part 1191.

International Building Code 2000(IBC).

NFPA-101, Life Safety Code.

Department of Defense Antiterrorism/Force Protection Construction Standards (with Army Supplemental Guidance) interim standards, 16 Dec. 99.

Army TM 5-853-1, Security Engineering Project Development, May 1994.

Army TM 5-853-2, Security Engineering Concept Design, May 1994.

Army TM 5-853-3, Security Engineering Final Design, May 1994.

Army TM 5-853-4, Security Engineering Electronic Security Systems, May 1994.

Army AR 190-11, Physical Security of Arms, Ammunition, and Explosives

Army Technical Letter 1110-3-491, Sustainable Design for Military Facilities.

Sustainable Project Rating Tool for military facilities, available at <http://www.usace.army.mil/inet/usace-docs/eng-tech-ltrs/etl1110-3-491/a-c.pdf>

Army Technical Instructions TI 809-04, Seismic Design for Buildings.

DG-1110-3-145, USACE, Design Guide for Fire Stations, March 1986.

5.4 BUILDING AREAS

5.4.1 Gross Area: The gross floor area of the Fire Station Modification and Addition shall equal but not exceed 13,380 square feet. The gross area is the floor area measured from the outer surfaces of the exterior walls of the new addition and to include existing area to be renovated. The following required Summary of Program Activities are shown in Table I with approximate areas in gross square feet (GSF).

Summary of Program Activities and Proposed GSF

FUNCTIONAL ELEMENTS	GSF
Administrative/Operations	
Day Room	
Watch/Alarm Room with Toilet	
Training Room With Storage	
Shift Supervisor's Office	
Physical Training	
Medical Supply	
Workroom/Extinguishing Agent/Storage	
Chief's Office	
Administrative Supply Storage	
Fire Inspector's Office	
Hose Dryer	
Janitor's Closet	
Mechanical/Electrical	
Subtotal GAF-Administrative	4,555
Dormitory/Kitchen Area	
Dormitory Units	
Male Toilet with Showers	
Female Toilet with Showers	
Kitchen	
Dining	
Subtotal GAF-Dormitory/kitchen	3,065
Apparatus Room	
% Drive-Through Bays (7-8 vehicles)	5,760
Subtotal GAF-Apparatus Room	5,760
TOTAL GROSS AREA	13,380

5.4.2 Excluded Space. Attic areas where average clear height does not exceed 7 feet; crawl spaces; exterior uncovered loading platforms or facilities, either depressed, ground level or raised; open courtyards; open paved terraces; roof overhangs and soffit for weather protection; uncovered ramps; uncovered stoops; and utility tunnels and raceways will be excluded from the gross area.

5.4.3 Net Floor Areas: Net floor area is that space within the interior faces of exterior walls and/or interior walls. Actual amount on space required for each area will be determined by the Design-Build Contractor to accommodate equipment and furniture requirements and space clearances for equipment service. Mechanical and Electrical Rooms may be resized to accommodate efficient layout of mechanical and electrical equipment.

5.5 INTERIOR BUILDING SPACE

5.5.1 The following interior building spaces are required and shall be included in the modification and addition. Attachment 1 shall be referenced as a conceptual plan layout. Modification of existing space shall address the step down into the original apparatus bays. Existing and new floors shall align or be accessible by any means necessary. Special requirements for all program areas are as follows:

5.5.1.1 Existing Vestibule: The existing vestibule shall be designed with durable finishes for walls, ceiling, and floor. New outer and inner doors shall be provided. Doors shall be min. double 3' wide x 7' high. Access through these doors shall be handicap accessible.

5.5.1.2 Existing Main Corridor: Corridor shall serve as main access to fire station side of building. Some spaces along this corridor used by the fire station shall be turned over to the PMO.

5.5.1.3 Existing toilet room along main corridor shall become public handicapped accessible toilet. Modifications to this toilet room shall be made as required to achieve ADA compliance. Fixture clearances and types shall be removed and replaced with new as required.

5.5.1.4 Watch Alarm Area: Expansion into existing apparatus area with rated observation window and frame into new apparatus bay area.

5.5.1.5 Corridors: Corridors shall be minimum 6'-0" net clear width.

5.5.1.6 Administration Area: Fire personnel offices connected to existing main corridor and kitchen/dining area. Area to include Fire Chief Suite with Bunk and personal bathroom, storage room, Inspector's Office and Assistant Chief Captains Office.

5.5.1.7 Kitchen and Dining Area: New kitchen shall have commercial grade cabinets and countertops with individual food storage lockers. Existing appliances to be reused shall include refrigerator/freezer and six-burner range. New commercial grade dishwasher, stainless steel range hood, 24 inch gas griddle (beside stove and under hood) and double sink with garbage disposal shall be provided and integrated into new layout. Dining area to have direct access to kitchen with buffet style serving capability.

5.5.1.8 Dayroom: Fire Personnel lounge with dimmer switch lighting and organization to allow for seating and television viewing. Existing door to exterior to be removed and new window and wall infill to be provided to match existing.

5.5.1.9 Dorm Room Area: Sleeping rooms with lockable closets for each shift shall be organized around a private corridor with connection to women and men's toilet room. All doors leading to private corridor shall have posted signage reading "Fire Department Personnel Only". Public to have no access to this area. Direct egress from this area to new apparatus bays shall accommodate required fire response time. A private laundry room shall accessible by all rooms for use by the fire personnel. See table below for staff per shift and sleeping accommodations:

Staffing

	Staffing Per shift -----	Typical Min. Staffing -----	No. Beds -----
FIRE PROTECTION SECTION			
Assistant Chief and Crew Chief	1	3	1
Driver/Firefighter	10	21	10
Firefighter		Incl. above	
ADMINISTRATIVE SECTION			
Chief	1	1	1
Secretary	1	1	-
FIRE PREVENTION SECTION			
Fire Inspectors		Incl. above	1

TOTALS	13	26	13

5.5.1.10 Apparatus Area: Provide five bays base on vehicle size and clearances required and verified by fire personnel. Provide bay size based on vehicle size as follows:

Vehicle List

No.	Description	Length/Width
----	-----	-----
1	Engine 501-1250 GPM Structural pumper	28'-5" X 9'-4"
1	Engine 502-1250 GPM Structural pumper	30'-0" X 9'-2"
1	Engine 503-1250 GPM MACI Crash Vehicle	27'-6" X 9'-2"
1	Hazmat Vehicle-20 FT Rescue Body (estimated)	39'-0" X 9'-0"
1	Engine 19-reserve Engine	27'-0" X 9'-0"
1	Utility-50-Special response Vehicle	21'-5" X 9'-1"
1	GSA-Chief's Vehicle	18'-6" X 8'-0"
2	GSA-General Purpose Vehicles	16'-0" X 7'-0"
1	Confined Space trailer	20'-4" X 8'-4"

5.5.1.10.1 High windows shall be introduced to provide natural light into entire apparatus bay area.

5.5.1.10.2 SCBA compressor, hose storage racks, electric hose dryer and fire extinguisher storage shall be located on the western side of the apparatus area with no obstruction to vehicle access.

5.5.1.10.3 Walls to be a masonry material with a protective coating that provides a durable finish and moisture resistance.

5.5.1.10.4 Adjacent watch room to have rated observation glass into the apparatus area for monitoring control.

5.5.1.10.5 Apparatus bays shall have power, air and exhaust collection system drops for each vehicle.

5.5.1.10.6 Minimum 14' wide by 16' high insulated steel overhead doors with partial or full view glass and automatic openers with necessary controls. Controls shall be manual and Watch Alarm Room controlled as required for fire response. Doors shall be provided with wind-locks and necessary measures to stabilize doors.

5.5.1.10.7 Each overhead door jamb shall be protected by 3'-0" high painted steel bollards (concrete filled) for resistance to vehicle impact.

5.5.1.10.8 Radiant gas heat shall be provided between each vehicle bay.

5.5.1.10.9 Fluorescent lighting shall be provided for entire area.

5.5.1.11 Women's Toilet Room: Wall Hung Lavatories, Wall Hung Toilets, Ceiling Hung Partitions and Shower Stall.

5.5.1.12 Men's Toilet Room: Wall Hung Lavatories, Wall Hung Urinals, Wall Hung Toilets, Ceiling Hung Partitions and Shower Stall.

5.5.1.13 Training Room: Training room shall be capable of being divided into two separate rooms by way of an operable partition. Each half of the training room shall be accessible from an interior corridor. The training room shall accommodate 20 people. Space shall be equipped with an overhead projector and a projection screen, and a visual board.

5.5.1.13.1.1 Projector and Screen: Projector screen shall be ceiling recessed, motorized, sized to accommodate viewing and room orientation. Projector shall be capable of being tied into personnel computers (PC) for presentations and instruction by way of communications ports every 8 feet along all walls. These items shall be purchased and installed by the construction contractor under this RFP.

5.5.1.13.1.2 Visual Board: Visual wall-mounted board with tack able and porcelain marker surfaces shall be provided approximately 3'-6" high x 9' wide. This item shall be purchased and installed by the construction contractor under this RFP.

5.5.1.14 Women's and Men's Toilet Rooms: Toilet rooms shall be provided with floor drains.

5.5.1.14.1.1 Toilets: Toilets shall be provided in accordance with the *National Standard Plumbing Code*. Existing public handicapped toilet shall be evaluated for accessibility. Fire Personnel do not require handicapped accessible toilets in personnel toilets. Toilets shall be vitreous china.

5.5.1.14.2 Lavatories: Lavatories shall be provided in accordance with the *National Standard Plumbing Code*. Lavatories shall be vitreous china mounted under counter. Counter shall be, wall mounted, solid surface polymer as described below in "Solid Surfaces", or other nonporous, hard surface, easily maintained product at least 1 inch thick with side panels, intermediate supports, with 4 inch back splash and 4" end splashes at walls. Counters shall be sealed to walls.

5.5.1.14.3 Urinals: Urinals for men's room shall be provided in accordance with the *National Standard Plumbing Code*. Urinals shall be vitreous china.

5.5.1.14.4 Shower/Shower Rooms: Provide at least one shower in each toilet room or adjacent to each toilet room in separate room with door. Shower units shall be one-piece acrylic with built-in soap dish and glass shower door with stainless steel. Shower shall be provided with a recessed low-voltage, recessed ceiling mounted light fixture, switched from outside the shower compartment. Shower units shall be provided with a full soffit to the ceiling with an access panel for access to the shower light transformer. Shower rooms shall be provided with floor drains.

5.5.1.14.5 Toilet Partitions: Toilet partitions shall be solid plastic non-porous polymer as described below in "Solid Surfaces". Partitions shall be floor and wall mounted, not ceiling mounted. All hardware for toilet partitions shall be stainless steel.

5.5.1.14.6 Toilet Accessories: All toilet accessories shall be satin finish stainless steel. All toilet accessories shall be blocked in walls. Toilet

accessory finishes shall be compatible with one another and shall be coordinated.

5.5.1.14.6.1 Grab Bars: Grab bars shall be evaluated and provided (if required) in existing handicapped toilet room in accordance with ADA and Uniform Federal Accessibility Standards and in conformance with FS WW-P-541.

5.5.1.14.6.2 Glass Mirrors: Shall be provided in conformance with FS DD-M-411. Provide mirrors in each toilet room. Provide one 18 inch x 30 inch tilt mirror in existing toilet room above handicap lavatory.

5.5.1.14.6.3 Toilet Seat Cover Dispenser: Provide one toilet seat cover dispenser with a capacity of 200 seat covers in each toilet room. Dispenser shall be stainless steel.

5.5.1.14.6.4 Sanitary Napkin Dispenser/Disposer: Provide one sanitary napkin dispenser in the women's room and a sanitary napkin disposer in each toilet compartment. Dispenser shall be coin operated, cost as per user requirements. Dispenser and disposer shall be stainless steel.

5.5.1.14.6.5 Toilet Tissue Dispenser: Provide a wall mounted, stainless steel toilet tissue dispenser in each toilet compartment. Toilet tissue dispensers shall have two rolls of tissue stacked vertically and shall be roller mounted on two support brackets. Brackets shall be stainless steel.

5.5.1.14.6.6 Soap Dispenser: Provide one soap dispenser for each lavatory. Soap dispensers shall be liquid type consisting of Type 304 stainless steel tank with holding capacity of 32 fluid ounces with a corrosion-resistant all-purpose valve that dispenses liquid soaps, provided in combination with a wall mounted glass mirror over each lavatory. All toilet rooms shall be handicapped accessible per ADA and UFAS requirements.

5.5.1.14.6.7 Paper Towel Dispenser/Disposer: Provide semi-recessed, wall mounted, stainless steel, combination paper towel dispenser and disposal near lavatory in each toilet room. Dispenser/receptacle shall have a capacity of 400 sheets of C-fold, single-fold, or quarter-fold paper towels. Waste receptacle shall be designed to be locked in unit and removable for service. Locking mechanism shall be tumbler key lock. Waste receptacle shall have a capacity of 12 gallons. Unit shall be fabricated of not less than 0.030-inch stainless steel welded construction with all exposed surfaces having a satin finish. Waste receptacle that accepts reusable liner standard for unit manufacturer shall be provided.

5.5.1.15 Janitor Closet: Shall have fixed, wall-mounted shelving and a floor mounted mop sink with mop rack. Mop sink shall be provided with a backsplash.

5.5.1.16 The construction contractor shall relocate one existing SCBA compressor and related items from the existing facility to the new apparatus room.

5.6 GENERAL REQUIREMENTS:

5.6.1 "Summary of Program Activity and Gross Area" and Attachment 1, "Conceptual Floor Plan" required by this RFP for organizational guidelines.

5.6.2 Minimum Ceiling Height: The minimum ceiling height shall be 8'-0".

5.6.3 Vision Panels: Doors to all enclosed offices shall have vision panels.

5.6.4 Accessibility: All areas and rooms, except mechanical, electrical rooms shall be handicapped accessible per the Uniform Federal Accessibility Standards and ADAAG. Access walks, ramps and public ways shall also be accessible per the above stated criteria.

5.6.5 Sprinkler System: All expansion and renovated areas of the fire station, excluding PMO, shall be equipped with a wet sprinkler system.

5.6.6 Provide all rooms with PA Speaker system. Bedrooms will be equipped with volume control. New equipment shall be compatible with existing system.

5.6.7 HVAC System: Heating and cooling will provided in renovated areas by expansion of existing equipment. All dorm rooms shall have individual thermostats. Heating shall be provided in the apparatus bays.

5.6.8 Acoustical Design: The designers must address isolation of noise from a variety of sources, including but not limited to; office to office, office to training rooms, training room to physical fitness room, corridors to work rooms/offices/training, mechanical/electrical equipment and apparatus bays to all adjacent spaces. Acoustical treatment of the walls and ceiling must be designed to provide an STC rating that isolates the noises from the sources listed above. Walls between rooms and corridors must have a sound transmission class (STC) of at least 50. Doors in those walls must have an STC of at least 45. Ceiling assemblies must have an STC of at least 55. Sufficient insulating material shall be provided in the attic space to meet both the thermal and acoustical requirements specified herein.

5.6.9 Interior Finishes:

5.6.9.1 Floors

5.6.9.1.1 Carpets: Unless indicated in other sections of this RFP, carpets shall be provided in all individual offices, open offices, corridors, conference/training rooms, dorm rooms and private corridor.

5.6.9.1.2 Vinyl Composition Tile: Unless indicated in other sections of this RFP, vinyl composition tile shall be provided in storage rooms, utility rooms, kitchen, workroom, dining area and equipment maintenance rooms.

5.6.9.1.3 Ceramic/Porcelain Tile: Unless indicated in other sections of this RFP, tile shall be provided in toilet rooms, shower rooms, janitor closet, and entry vestibule.

5.6.9.1.4 Epoxy Floor Coating: "Fire House Flooring" or equal non-slip floor coating shall be provided at entire concrete floor area at Apparatus Bays. Visual guidelines for vehicle parking shall be integrated into design and color selected by fire personnel.

5.6.9.2 Walls

5.6.9.2.1 Vinyl Wall Coverings: Unless indicated in other sections of this RFP, vinyl wall coverings shall be provided in individual offices, open offices, corridors, reception area, and conference/training rooms.

5.6.9.2.2 Ceramic Tile Walls: Unless indicated in other sections of this RFP, ceramic tile shall be provided in toilet rooms, shower rooms, and janitor closet.

5.6.9.2.3 Painted Walls: Unless indicated in other sections of this RFP, paint shall be provided on all walls except where vinyl wall covering or ceramic tile is being provided.

5.6.9.2.4 Chair Rails and Corner Guards: Unless indicated in other sections of this RFP, chair rails and corner guards shall be provided in individual offices, open offices, corridors, and conference/training rooms.

5.6.9.3 Ceilings

5.6.9.3.1 Acoustical Ceiling Tile: Unless indicated in other sections of this RFP, acoustical ceiling tile shall be provided in all areas except toilet rooms, shower rooms, janitor closet, arms room, edit studios, sound studio, and graphics room.

5.6.9.3.2 Paint: Painted gypsum board shall be provided on ceilings in all utility rooms, toilet rooms, shower rooms, and janitor closet.

5.6.9.3.3 All exposed steel structure and steel decking shall be painted at Apparatus Bay Area.

5.7 BUILDING SHELL

5.7.1 Foundation & Floor Construction: The building will be permanent construction of concrete foundation and floor slab.

5.7.2 Steel Doors and Frames: Exterior doors shall be heavy-duty 1 3/4" thick steel, commercial style steel doors and steel frames, except for aluminum/glass storefront-type doors at entrances. Exterior doors shall be insulated and weather-stripped.

5.7.3 Aluminum Store-Front Type Doors and Exterior Windows: Doors and windows shall be glazed with *laminated insulated glass in accordance with the Interim Department of Defense Antiterrorism/Force Protection Construction Standards* and shall conform to ASTM E 773 and ASTM E 74. Glazing shall be bronze tinted. Glazing shall have a maximum condensation factor of 48% in accordance with AAMA 1502.7. Frame shall have bronze anodized finish with a minimum of 0.4- mil thick. Organic coating shall be manufacturer's standard acrylic or polyester, bake-on, electrostatically applied enamel coating of 1.0 +.2 mils) dry film thickness minimum. All coatings shall be factory applied.

5.7.4 Windows bronze tinted glass and bronze anodized finished frames. All windows shall be heavy commercial class 40 (HC-40) grade. All window frames

shall have *laminated* glazing units *in accordance with the Interim Department of Defense Antiterrorism/Force Protection Construction Standards*. All window frames shall be constructed with a thermal break feature. All window frames shall be designed to withstand a 90 mile per hour wind velocity. Windowsills shall be solid surface polymer or other nonporous, hard surface, easily maintained product.

5.7.5 *Interior Glazing*: Glass shall conform to the requirements of ASTM C1036. Glass in doors and adjacent to doors shall conform to the requirements of CFR 16 Part 1201. Glazing of interior vision panels shall conform to CFR 16 Part 1201.

5.7.6 Roof for the expansion area shall be a standing seam metal roof or other roof system may be proposed. SSRS Roof slope and finish shall match both color and configuration of adjacent buildings. Provide continuous roof slope to the perimeter of the building. Do not design interior valleys or depressions that will form ponds. The new roof shall have no roof drains but shall dispose of water by gutters and downspouts to underground collection system into base storm sewer system.

5.7.6.1 Roof Panels: Panels shall be 22 - 24 gauge standing seam metal steel and shall have a factory color finish. Finish shall be Kynar 5000 coating technology or equal and *must meet the performance requirements stated herein*. Roof deck assemblies shall be Class 90 as defined in UL 580. Length of sheet shall be sufficient to cover the entire length of any unbroken roof slope when such slope is 30 feet or less. When length of run exceeds 30 feet and panel splices are provided, each sheet in the run shall extend over three or more supports. Sheets longer than 30 feet may be furnished if approved by the Contracting officer. Width of sheets shall provide not more than 18 inches of coverage in place. SSMRS with roofing panels greater than 12 inches in width shall have standing seams rolled during installation by an electrically driven seaming machine. Height of standing seams shall be not less than 2-1/2 inches. All sheets shall be cut in the shop to correspond to the roof slope and may have a horizontal joint at the eave line.

5.7.6.1.1 Steel Panels: Zinc-coated steel conforming to ASTM A 446, G 90 coating designation. Panels shall be 22 - 24 gauge.

5.7.6.1.2 Aluminum Panels: Alloy conforming to ASTM B 209, temper as required for the forming operation, minimum 0.032-inch thick.

5.7.6.2 Performance Standards: The uplift resistance of the SSMRS shall be established as indicated in the "STANDARD TEST METHOD FOR STRUCTURAL PERFORMANCE OF SSMRS BY UNIFORM STATIC AIR PRESSURE DIFFERENCE". The SSMRS design shall be adequate for uplift if the established allowable pressure from testing causes no failure as defined in the STANDARD TEST METHOD FOR STRUCTURAL PERFORMANCE OF SSMRS BY UNIFORM STATIC AIR PRESSURE DIFFERENCE. Testing to ultimate capacity is not required.

5.7.6.3 Factory Color Finish: Roof panels shall have a factory finish on the exposed side. The exterior finish shall consist of a polyvinylidene fluoride coating. Finish shall be coil-coated custom color. The contracting officer shall approve color. The dry film thickness of the exterior coating shall be not less than 0.8 mil over a primer coat with a dry film thickness of 0.3

mils. The interior color finish shall consist of a mill finish. The exterior color finish shall meet the test requirements specified below. The manufacturer shall have conducted tests on previously manufactured sheets of the same type and finish as proposed for the project. The term "appearance of base metal" refers to the metal coating on the steel base metal. The dry film thickness of the interior prime coat shall be not less than 0.3 mils.

5.7.6.4 Testing Requirements

5.7.6.4.1 Salt Spray Test: A Sample of the sheets shall withstand a salt spray test for a minimum of 1000 Hours in accordance with ASTM B 117, including the scribe requirements in the test. Immediately upon removal of the panel from the test, the coating shall receive a rating of 10, no blistering, as determined by ASTM D 714; And rating of 7, 1/16-inch failure at scribe, as determined by ASTM D 1654.

5.7.6.4.2 Formability Test: When subjected to a 180-degree bend over a 3/8-inch diameter mandrel in accordance with ASTM D 522, Exterior coating film shall show no evidence of fracturing to the naked eye.

5.7.6.4.3 Accelerated Weathering, Chalking Resistance and Color Change: A sample of the sheets shall withstand a weathering Test a minimum of 2000 hours in accordance with ASTM G 23 using a Type D apparatus, without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with tape in accordance with ASTM D 3359, Test Method B, shall be considered as an area indicating loss of adhesion. After the 2000-hour weatherometer test, exterior coating shall not chalk greater than No. 8 rating in accordance with ASTM D 4214 test procedures. After the 2000-hour weather meter test, exterior coating color change shall not exceed 2 NBS units in accordance with ASTM D 2244.

5.7.6.4.4 Humidity Test: When subjected to a humidity cabinet test in accordance with ASTM D 2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creep age or corrosion.

5.7.6.4.5 Impact Resistance: Factory-painted sheet shall withstand direct and reverse impact in accordance with ASTM D 2794 equal to 1.5 times metal thickness in mils, expressed in inch-pounds, with no loss of adhesion.

5.7.6.4.6 Abrasion Resistance Test: When subjected to the failing sand test in accordance with ASTM D 968 the coating system shall withstand a minimum of 80 liters of sand before the appearance of the base metal.

5.7.6.4.7 Specular Gloss: Finished surfaces shall have a specular gloss of 20 or less at an angle of 60 degrees when measured in accordance with ASTM D 523.

5.7.6.4.8 Pollution Resistance: Coating shall show no visual effects when immersion tested in a 10 percent hydrochloric acid solution for 24 hours in accordance with ASTM D 1308.

5.7.6.5 Accessories: Accessories shall be furnished with the Standing Seam Metal Roof System. Flashing, gutters, soffits, fascias, trim, metal closure

strips, caps, snow guards, and similar metal accessories shall be not less than the minimum thickness specified for roofing panels. Exposed metal accessories shall be finished to match the panels furnished. Molded closure strips shall be closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chloride; premolded to match configuration of the covering and shall not absorb or retain water. Thermal spacer blocks and other thermal barriers at concealed clip fasteners shall be as recommended by the manufacturer.

5.7.6.6 Fasteners: Concealed fasteners for steel roof panels shall be zinc-coated steel, aluminum, corrosion resisting steel, or nylon capped steel, type and size specified below or as otherwise approved for the applicable requirements. Concealed fasteners for aluminum roof panels shall be aluminum or corrosion resisting steel. Fasteners for structural connections shall provide both tensile and shear strength of not less than 750 pounds per fastener. Fasteners for accessories shall be the manufacturer's standard. Exposed roof fasteners shall be gasketed or have gasketed washers on the exterior side of the covering to waterproof the fastener penetration. Washer material shall be compatible with the covering; have a minimum diameter of 3/8 inch for structural connections; and gasketed portion of fasteners or washers shall be neoprene or other equally durable elastomeric material approximately 1/8-inch thick.

5.7.6.6.1 Screws: Screws shall be as recommended by the manufacturer to meet the strength design requirements of the panels.

5.7.6.6.2 Bolts: Bolts shall be not less than 1/4-inch diameter, shouldered or plain shank as required, with locking washers and nuts.

5.7.6.6.3 Structural Blind Fasteners: Blind screw-type expandable fasteners shall be not less than 1/4-inch diameter. Blind rivets shall be 9/32-inch minimum diameter.

5.7.6.7 Insulation: Thermal resistance of insulation shall be not less than the R-values determined from the "U" values indicated in Table II below. R-values shall be determined at 75 degrees F in accordance with ASTM C 518. Insulation shall have a flame spread not in excess of 25 and a smoke developed rating not in excess of 50 when tested in accordance with ASTM E 84; shall be a standard product of a manufacturer, factory-marked or identified with manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages. Insulation shall have a facing providing a permeability of 0.1 perm or less when tested in accordance with ASTM E 96. Facing shall be white, either of reinforced foil with a vinyl finish or sheet vinyl except unreinforced foil with a natural finish may be used in concealed locations. Insulation shall have a facing providing a permeability of 0.02 perm or less when tested in accordance with ASTM E 96. Facing shall be of 2 mil thick white vinyl backed with 6 inch by 6 inch glass scrim and 0.7 mil thick metal foil laminate. Reinforced foil with a natural finish may be used for facing in concealed locations. Facings and finishes shall be factory applied

5.7.6.7.1 Rigid or Semi-rigid Board Insulation: Rigid board insulation shall conform to ASTM C 612, Form A, Class 1.

5.7.6.7.2 Blanket Insulation: Blanket insulation shall conform to FS HH-I-SS8, Form B, Type I, Class 6. Exposed insulation shall have a white sheet vinyl face.

5.7.6.7.3 Insulation Retainers: Insulation retainers shall be type, size, and design necessary to adequately hold the insulation and to provide a neat appearance. Metallic retaining members shall be nonferrous or have a nonferrous coating. Nonmetallic retaining members, including adhesives used in conjunction with mechanical retainers or at insulation seams shall have a fire resistance classification not less than that permitted for the insulation.

5.7.6.8 Concealed Anchor Clips: Concealed anchor Clips shall be as recommended by the manufacturer for the roofing system furnished. Clip bases shall have factory punched or drilled holes for attachment. Clips used with panel width greater than 12 inches shall be made from multiple pieces with the allowance for the total thermal movement required to take place within the clip.

5.7.6.9 Sealant: Except as stated below, sealants shall be elastomeric type containing no oil or asphalt. Exposed sealant shall cure to a rubber like consistency. All sealants shall be the non-hardening type. Roof panel standing seam ribs shall have continuous sealant that is factory installed.

5.7.6.10 Gaskets and Insulating Compounds: Gaskets and insulating compounds shall be non-absorptive and suitable for insulating contact points of incompatible materials. Insulating compounds shall be non-running after drying.

5.7.6.11 Sub-purlins: Sub-purlins, when required by the system design, shall be formed from steel sheet as standard with the manufacturer. The uncoated thickness may be a minimum of 0.059-inches if bolts or structural blind fasteners are used for attachment of the concealed anchor Clips to the sub purlins.

5.7.6.12 Vapor Retarder: Vapor retarder material shall be polyethylene sheeting conforming to the requirements of ASTM D 4397. A fully compatible tape shall be provided which has equal or better water vapor control characteristics than the vapor retarder material. A general-purpose tape, which has some resiliency and cushioning abilities, shall also be provided.

5.7.6.13 EPDM Rubber Boots: Flashing devices around pipe penetrations shall be flexible, one-piece devices molded from weather-resistant EPDM rubber. Rubber boot material shall be as recommended by the manufacturer. The boots shall have base rings made of aluminum or corrosion resisting steel that conform to the contours of the roof panel to form a weather-tight seal.

5.7.6.14 Gutters and Downspouts: Provide eave-mounted gutters on all roof sections. Provide downspouts for all gutter locations. Roof water shall be channeled into an underground storm water collection system by way of cast iron boots (at grade) and underground PVC piping connected to the base storm water system.

5.7.6.15 Warranties: The SSSMR system shall be warranted as outlined below. Any emergency temporary repairs conducted by the owner shall not negate the warranties. Such warranties shall start upon final acceptance of the work or the date the Government takes possession, whichever is earlier.

5.7.6.15.1 Contractor's Weather Tightness Warranty: The SSSMR system shall be warranted by the Contractor on a no penal sum basis for a period of five years against material and workmanship deficiencies; system deterioration caused by exposure to the elements and/or inadequate resistance to specified service design loads, water leaks, and wind uplift damage. The SSSMR system covered under this warranty shall include the entire roofing system including, but not limited to, the standing seam metal roof panels, fasteners, connectors, roof securement components, and assemblies tested and approved in. In addition, the system shall consist of panel finishes, slip sheet, insulation, vapor retarder, all accessories, components, and trim and all connections with roof panels. This includes roof penetration items such as vents, curbs, and skylights; gutters and downspouts; eaves, ridge, hip, valley, rake, gable, wall, or other roof system flashings installed and any other components specified within the contract to provide a weather tight roof system; and items specified in other sections of the specifications that are part of the SSSMR system. All material and workmanship deficiencies, system deterioration caused by exposure to the elements and/or inadequate resistance to specified design loads, water leaks and wind uplift damage shall be repaired. This warranty shall warrant and cover the entire cost of repair or replacement, including all material, labor, and related markups. The Contractor shall supplement this warranty with written warranties from the installer and system manufacturer, which shall be submitted along with Contractor's warranty; however, the Contractor shall be ultimately responsible for this warranty. The Contractor's written warranty shall be as outlined in the Corps Of Engineers Guide Specifications *SECTION 07416, STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM* for warranty and shall start upon final acceptance of the facility. It shall be required that the Contractor provide a separate bond in an amount equal to the installed total roofing system cost in favor of the owner (Government) covering the Contractor's warranty responsibilities effective throughout the five year Contractor's warranty period for the entire SSSMR system as outlined above.

5.7.6.15.2 Manufacturer's Material Warranties: Contractor shall furnish, in writing, the following manufacturer's material warranties which cover all SSSMR system components such as roof panels, anchor clips and fasteners, flashing, accessories, and trim, fabricated from coil material.

5.7.6.15.2.1 A manufacturer's 20 year material warranty warranting that the aluminum, zinc-coated steel, aluminum-zinc alloy coated steel or aluminum-coated steel as specified herein will not rupture, structurally fail, fracture, deteriorate, or become perforated under normal design atmospheric conditions and service design loads. Liability under this warranty shall be limited exclusively to the cost of either repairing or replacing nonconforming, ruptured, perforated, or structurally failed coil material.

5.7.6.15.2.2 A manufacturer's 20 year exterior material finish warranty on the factory colored finish warranting that the finish, under normal atmospheric conditions at the site, will not crack, peel, or delaminate;

chalk in excess of a numerical rating of eight as determined in ASTM D 4214 test procedures; or change color in excess of five CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. Liability under this warranty is exclusively limited to refinishing with an air-drying version of the specified finish or replacing the defective coated material.

5.7.6.15.2.3 A roofing system manufacturer's 20-year system weather tightness warranty.

5.7.6.16 Sheet Metalwork: Flashing shall be installed in conformance with the SMACNA Architectural Sheet Metal Manual.

5.7.6.17 Insulation

5.7.6.17.1 Provide the minimum insulation values based on ASHRAE 90.1-2001 as follows:

	RSI Value	"U" Value Equivalent
Gross Wall	19	.052
Roof	30	.033

TABLE II - Minimum Insulation Values

5.7.6.17.2 Gross Wall U-factor is the U-factor sum of each wall component (opaque wall, windows, doors, openings, etc.) times the area of that wall component, the sum divided by the total wall area.

5.7.6.17.3 Thermal and sound insulation shall have a flame spread rating of 25 or less and a smoke development rating of 50 or less exclusive of the barrier when tested in accordance with ASTM E-84. A vapor barrier shall be provided on the warm side of exterior and ceiling/roof insulation where occurs. Insulation shall have a facing providing permeability of 0.1 perm or less when tested in accordance with ASTM E 96.

5.7.6.18 Mechanical room shall have direct exterior access. Doorways and mechanical rooms shall be sized to permit maintenance and replacement of equipment located inside. Any mechanical/electrical equipment put on the exterior of these rooms shall be located adjacent to the mechanical room in an appropriate enclosure. This enclosure shall be of the same material as the exterior wall and shall extend to a height that conceals the equipment (wall height shall be not less than 6 feet tall). Equipment in this enclosure shall have a minimum 36" clearance on all sides.

5.7.6.19 As a minimum, exterior wall construction shall conform to all Force Protection measures. Design shall be coordinated with Installation Design Guidelines. Vertical expansion joints in masonry walls shall be placed between wall openings and pilasters, not adjacent to pilasters or at the end of lintels.

5.7.6.19.1 Brick Veneer: Grade SW shall be used for brick in contact with earth or grade and for all exterior work. Grade SW or MW shall be used in other brickwork. Brick shall be tested for efflorescence. Clay or shale

brick units shall be delivered factory-blended to provide a uniform appearance and color range in the completed wall. Solid clay or shale brick shall conform to ASTM C 216, Type FBX. Minimum compressive strength of the brick shall be 3000 psi.

5.7.6.19.2 Concrete Masonry Units: If used, hollow and solid concrete masonry units shall conform to ASTM C 90, Type I, Normal weight. Cement shall have low alkali content and be of one brand. Units shall be modular in size and shall include closer, jamb, header, lintel, and bond beam units and special shapes and sizes to complete the work. Units used in exposed masonry surfaces shall have a uniform fine to medium texture and a uniform color. Concrete masonry units used in fire-rated construction shall be of minimum equivalent thickness for the fire rating indicated.

5.7.6.19.3 Steel Framing: If used, steel framing shall conform to American Iron and Steel Institute (AISI), Cold Formed Steel Design Manual, American Institute of Steel Construction (AISC) ASD, Manual of Steel Construction, Allowable Stress Design, and TI 809-07, Design of Cold-Formed Load Bearing Steel Systems and Masonry Veneer/Steel Stud Walls. Cold-formed framing shall consist of steel studs, top and bottom tracks, runners, horizontal bridging, and other cold-formed members and other accessories. All members and components made of sheet steel shall be hot-dip galvanized in accordance with ASTM A 653/A 653M with a minimum coating thickness of G 60. This framing shall be used only in framing the exterior masonry veneer steel stud wall system.

5.7.6.19.4 Wood Framing: If used, wood framing shall conform to American Forest and Paper Association (AF & PA) Manual For Wood Frame Construction and National Design Specification For Wood Construction, AF & PA T01.

5.7.6.20 Caulking and Sealants: Caulking and sealants shall be selected according to materials it is being applied to for compatibility. These sealants and caulks shall be of either a two-component, rubber base; chemical-curing compound based on polysulfide and/or polyurethane; or a single-component, rubber base, chemical curing compound such as polysulfides, polyurethanes, and silicones. Caulking shall occur around all door frames, all window frames, and at all material changes. The minimum joint width shall be 1/4 inch, and joint widths in excess of 1/4 inch shall have a backstop material provided in the joint, and the depth of all joints shall be equal to the width. Color to match adjacent materials.

5.8 INTERIOR CONSTRUCTION

5.8.1 Interior Partitions: Heights shall be minimum 8 feet 0 inch. Interior partitions shall either be steel stud or Concrete Masonry Unit Partitions (CMU) with gypsum wallboard finish.

5.8.1.1 Steel Framing: If used, Cold-formed framing shall consist of steel studs, top and bottom tracks, runners, horizontal bridging, and other cold-formed members and other accessories. All members and components made of sheet steel shall be hot-dip galvanized in accordance with ASTM A 653/A 653M with a minimum coating thickness of G40. Studs shall conform to ASTM C 645.

Studs shall be C-shaped, roll formed steel with minimum uncoated design thickness of 0.0284 inch.

5.8.1.2 Concrete Masonry Unit Partitions (CMU): If used, hollow and solid concrete masonry units shall conform to ASTM C 90, Type I, Normal weight. Cement shall have low alkali content and be of one brand. Units shall be modular in size and shall include closer, jamb, header, lintel, and bond beam units and special shapes and sizes to complete the work. Units used in exposed masonry surfaces shall have a uniform fine to medium texture and a uniform color. Concrete masonry units used in fire-rated construction shall be of minimum equivalent thickness for the fire rating indicated.

5.8.1.3 Gypsum Wallboard: Gypsum wallboard shall conform to the requirements of ASTM C36 and be 48" wide, 5/8" thick and tapered edged. Steel framing, furring, and related items shall conform to the requirements of ASTM C645 and C955 where applicable. Joint treatment materials shall conform to the requirements of ASTM C475. Screws shall conform to the requirements of ASTM C 1002 and C 954 where applicable. Corner beads, edge trim, and control (expansion) joints shall conform to the requirements of ASTM C1047, and shall be corrosion protective-coated steel design 11 for its intended use. Flanges shall be free of dirt, grease, and other materials that may adversely affect the bond of joint treatment.

5.8.1.4 Acoustical Ceilings: Acoustical ceiling tile shall conform to ASTM E1264; Class A. Panel size shall be 2 feet by 2 feet. The suspension system shall conform to ASTM C635. Compression struts shall be provided at 12'-0" intervals in both directions and shall be provided 4'-0" from each wall. Hanger wires shall be provided, splayed in four directions from each compression strut and through the compression strut to the structure above per TI 809-04, Seismic Design for Buildings. Size and diameter of strut shall be derived from a standard table or arrived at by engineering calculations.

5.8.1.5 Wood Doors: Interior doors shall be 1 3/4" solid core flush wood doors, stain to match wood finish throughout the facility, laminated solid core doors. Door lites on interior doors shall be sized in accordance with building codes and positioned at a height above finished floor to allow vision on both sides.

5.8.1.5.1 Hardware: All interior hardware in this building shall be consistent and shall be a brushed aluminum finish.

5.8.1.5.2 Hinges: Exterior hinges shall have non-removable pins and be stainless steel, Grade 1; anti-friction or ball bearing; and 3 each of 4-1/2" x 4-1/2" per leaf up to 3' wide door 5" x 5" for doors 3' to 4' wide. Interior hinges shall be Grade 1; antifriction or ball bearing; and 3 each of 4-1/2" x 4-1/2" Per leaf up to 3' wide door 5" x 5" for doors 3' to 4' wide. Hinges for labeled fire doors must be either steel or stainless steel. Exterior hinges for aluminum/glass storefront type doors shall be Divot hinges or offset Divot hinges (3 per leaf). Hinges shall conform to ANSI/BHMA A156.1 and A156.7.

5.8.1.5.3 Locksets, Latchets, Exit Devices, and Push and Pull Plates: Exterior doors shall have mortise locks conforming to ANSI/BHMA A156.13 for metal doors and conforming to ANSI/BHMA A156.5 for aluminum/glass store

front-type doors, Grade 1. Emergency exit devices shall be Grade 1, flush-mounted type. Interior doors shall have mortise locksets conforming to ANSI/BHMA A156.13, Series 1000, Grade 1. All locks and latchsets shall be the product of the same manufacturer. Locksets and latchsets shall be provided, as required, with lever handles on each side.

5.8.1.5.4 Cylinders: Lock cylinders shall comply with BHMA A156.5 and be compatible with BEST. Lock cylinder shall have seven pins. Cylinders shall have key removable type cores. Provide an extension of the existing keying system. Construction cores shall be provided. All locksets, exit devices, and padlocks shall accept same interchangeable cores. Fire Personnel prefer "Cipher" locksets throughout the building to be integrated into existing system. Coordination shall be with Jim Martz (301) 619-2886 at the Directorate of Installation Support (DIS).

5.8.1.5.5 Closers: Closers shall be provided on all exterior doors and fire-rated doors. Closers shall conform to ANSI/BHMA A156.4, Grade 1. Closers shall be surface-mounted, modern type, with cover. Closers shall be provided with options PT-4F and PT-4H (delayed action and barrier free).

5.8.1.5.6 Keying: Keying shall be in accordance with the existing Best lock system and shall be coordinated with Jim Martz (301) 619-2886 at the DIS. All keying shall be done at the factory. All locks shall be furnished with removable core cylinders. Replacement cores shall be BEST removable cores. Keys and permanent cores shall be shipped directly to the DIS, Ft Detrick, MD. All exterior doors shall be keyed alike in one group. All interior doors shall be keyed as specified by the facility user. All submittals/shop drawings referring to keys and keying shall be submitted to the DIS for coordination and approval. A key cabinet shall be provided with a capacity 50% greater than the number of key changes used for door locks. Location of Key cabinet shall as directed by user.

5.8.1.5.7 Thresholds: All exterior doors (except Mech/Elec rooms) shall be provided with aluminum thresholds conforming to ANSI/BHMA A156.21 and are handicapped accessible; color to be bronze. Doors at ceramic tile flooring shall be provided with marble thresholds that are handicapped accessible.

5.8.1.5.8 Kick Plates and Mop Plates: Metal Kick plates or mop plates shall be provided on all wood doors. Match metal finish with door hardware finish as specified in this section. Kick plates and mop plates shall comply with ANSI/BHMA A156.6, shall be 16" high by 2" less than width of door. Edges shall be beveled.

5.8.1.5.9 Door Stops: Doorstops shall be provided on all exterior and interior doors. Doorstops shall comply with ANSI/BHMA A156.16 and shall be bronze, Grade 1.

5.8.1.6 Glazing: Glass shall conform to the requirements of ASTM C1036. Glass in doors and adjacent to doors shall conform to the requirements of CFR 16 Part 1201. Glazing of interior vision panels shall conform to CFR 16 Part 1201. All glazing shall be laminated.

5.8.1.7 Ceramic Tile: Tile shall be standard grade conforming to ANSI A137.1. Tile shall be impact resistant with a minimum breaking strength for

wall tile of 90 lbs and 250 lbs for floor tile in accordance with ASTM C 648. Water absorption shall be 0.5 maximum percent in accordance with ASTM C 373. Floor tile shall have a minimum static coefficient of friction of 0.5 in accordance with ASTM C 1028. Tile shall be Class III as rated by the manufacturer when tested in accordance with ASTM C 1027 for abrasion resistance as related to foot traffic. Ceramic mosaic tile and trim shall be unglazed natural clay with cushion edges. Tile size shall be 2 x 2 inches. Glazed wall tile and trim shall be cushion edged with matte glaze. Tile shall be 4-1/4 x 4-1/4 or 6 x 6 inches.

5.8.1.7.1 Tile setting Bed: The setting-bed shall be composed of portland cement, sand, water, and hydrated lime. Portland cement shall conform to ASTM C 150, Type I, white for wall mortar and gray for other uses. Sand shall conform to ASTM C 144. Hydrated lime shall conform to ASTM C 206, Type S or ASTM C 207, Type S. Water shall be potable.

5.8.1.7.2 Tile Backer Board: All ceramic wall tile shall be backed with cementitious backer board.

5.8.1.7.3 Mortar and Grout: Dry-set portland cement Mortar shall conform to ANSI A118.1. Latex portland cement Mortar shall conform to ANSI A118.4. Ceramic tile Grout shall conform to ANSI A118.6. Tile Backer Board shall comply with ANSI A118.9. Tile adhesives shall not be used for this project.

5.8.1.7.4 Marble Thresholds: Marble shall be Group A as classified by MIA-01. Marble shall have a fine sand-rubbed finish and shall be white in color as approved by the Contracting Officer. Marble abrasion shall be not less than 12.0 when tested in accordance with ASTM C 241.

5.8.1.7.5 Porcelain Paver Tiles: Porcelain paver tiles shall be of standard grade quality and shall conform to requirements of ANSI A137.1, ASTM C373, ASTM C501, and ASTM C648. Coefficient of friction shall be minimum 0.5. Unglazed porcelain tile shall be unpolished. Porcelain tile shall be furnished in nominal 12" x 12" size. Base shall be cove type with inside and outside corners.

5.8.1.8 Resilient Flooring: Sheet vinyl shall conform to FS LF 475A (3) Type II; Grade A. Static load limit according to ASTM F 970 shall be not less than 12,5 psi. Sheet vinyl flooring shall be not less than 72 inches wide and shall have an alkali and moisture resistant backing. Color and pattern shall be dispensed uniformly throughout the thickness of the wear layer. Integral (flash) cove is created by extending the sheet vinyl 4 inches up the wall supported by a cove stick having a minimum radius of 7/8 inch and adhering to the wall with manufacturer's suggested adhesive and heat welding the seams. The integral coving shall be capped with an approved cap strip installed in accordance with the manufacturer's recommendations. Wall base shall conform to FS SS-W-40, Type I or Type II; Style B. Base shall be 4-inches high, minimum 0.080-inch thick. Edge strips of vinyl plastic, 1 inch wide and of thickness to match flooring. Adhesive for flooring, integral coving and wall base shall be as recommended by the flooring manufacturer. To create seams that provide a strong barrier against dirt and moisture penetration, the seams shall be heat welded per manufacturer's recommendations. Polish shall conform to FS 2F 430 or FS PW 155.

5.8.1.9 Carpet: Solid color carpets are NOT acceptable unless used as an accent or border. Carpet shall be a multi-colored, non-directional pattern with a minimum of 3 distinct colors. Bold tweed design containing a combination of shades of same color does not meet pattern requirements and will not be accepted. Carpet shall be of commercial quality. If carpet and carpet borders are specified, they shall be of same manufacturer, appearance, colors, etc. A 4" carpet base may be substituted for resilient base. The match carpet shall be used to form the carpet base. The carpet base edge shall be finished (bonded or surged) and capped with vinyl molding strip that is designed for the type of carpet being installed. The vinyl cap shall coordinate with the carpet and wall finishes. Carpet shall have an attached enhanced performance cushion. Molding shall be vinyl. Vinyl molding shall be heavy-duty and design for the type of carpet being installed. Color shall coordinate with carpet and adjacent surface. Carpet grade and quality shall be similar to "Lee's Facility Four" or approved equal. Carpet and padding shall be "non-off-gasing". The following are minimum physical characteristics:

5.8.1.9.1 Carpet Fabrication: Tufted

5.8.1.9.2 Carpet Category: Broadloom

5.8.1.9.3 Pile Type: Level Loop.

5.8.1.9.4 Pile Fiber: Branded commercial, 100% nylon with soil hiding and static control properties.

5.8.1.9.5 Gauge Pitch: 1/10 inch

5.8.1.9.6 Face Weight: minimum 32 oz. per square yard. This does not include weight of backings. Weight of actual surface yarn exposed to wear above carpet backing shall be determined in accordance with ASTM D 418.

5.8.1.9.7 Dye Method: Solution, Space Dyed are recommended.

5.8.1.9.8 Backing: Carpet shall be backed with an attached cushion.
Following are minimum performance requirements:

5.8.1.9.9 Static Control: Shall be provided to permanently 'control static buildup to less than 3.0KV when tested at 20 percent Relative humidity and 21 degrees C (70 degrees F) in accordance with AATCC 134.

5.8.1.9.10 Flammability and Critical Radiant Flux Requirements: Carpet shall comply with CFR 16 Part 1630. Carpet in corridors and exits shall have a minimum average critical radiant flux of 0.45 watts per square centimeter when tested in accordance with ASTM E 648.

5.8.1.9.11 Flame Resistance: Shall pass DOC-FF1-70

5.8.1.9.12 Tuft Bind: Shall be minimum 40 N (9-pound) average force when tested in accordance with ASTM D 1335.

5.8.1.9.13 Colorfastness to Crocking: Dry and wet crocking shall comply with AATCC 16 and shall have a minimum 4 gray scale rating after 40 hours.

5.8.1.9.14 Delamination Strength: Delamination strength for tufted carpet with secondary back shall be minimum of 2.5 lb/inch in accordance with ASTM D 3936.

5.8.1.9.15 Antimicrobial: Nontoxic antimicrobial treatment guaranteed by the carpet manufacturer to last the life of the carpet.

5.8.1.9.16 Density shall be minimum 4500 as determined by using the following formula: $\text{Density} = (W) (36) / T$. W is pile yarn weight, T is pile thickness.

5.8.1.10 Firestopping: Material shall have a flame spread of 25 or less, a smoke developed rating of 50 or less, and a fuel contribution of 50 or less when tested in accordance with ASTM E 84 or UL 723. The materials shall be nontoxic to human beings at all stages of applications and during fire conditions. Firestopping materials for through penetrations of fire resistance rated construction shall provide fire resistance rating in accordance to ASTM E 814 or UL 1479. Firestopping materials for construction joints in fire resistance rated construction shall provide a fire resistance rating in accordance to ASTM E 119 or UL 263. Construction joints include those joints used to accommodate expansion, contraction, wind or seismic movement of the building. Material shall be non-combustible when tested in accordance with ASTM E 136.

5.8.1.11 Painting: Interior surfaces, except factory prefinished material or interior surfaces receiving acoustical wallcovering or vinyl wallcovering, shall be painted a minimum of two prime coats and one finish coat. The prime coats for concrete masonry units shall be TT-F-1098. All spaces shall have satin or eggshell or semi-gloss finish on walls, semi-gloss finish on trim and eggshell or semi-gloss finish on ceilings. Stain or natural finished interior wood doors are preferable. Multi-colored paint systems shall be applied according to manufacturer's installation instructions and warranty. All exterior surfaces to be painted, including all utility appendages shall receive a minimum of one prime coat and two finish coats of paint. Water repellent sealer shall be clear, water repellent solution designed to protect vertical concrete masonry surfaces from water penetration. Application of paint. Paint shall be applied by brush or roller. Spray painting method shall be used only under approved conditions. Before start of spraying, all surfaces that do not require painting shall be completely masked and protected. Adequate drop cloths shall be provided over floors that may be stained or damaged from the spray work. The Contractor shall be liable for all damage resulting from the spray painting operation. All such damages shall be satisfactorily repaired and resolved at no additional cost to the Government. Adequate ventilation shall be provided during paint application. All persons engaged in spray painting shall wear respirators. Adjacent areas shall be protected by approved precautionary measures. Paints shall comply with State Regulations and the following Federal and Military Specifications. No lead paints are acceptable. Interior latex paints are not permitted in toilet rooms. Colors shall be as approved from schemes submitted with proposal. Each proposal shall include one basic exterior and interior color coordinated schemes and color samples. Pipes in exposed areas and in accessible pipe spaces shall be provided with color band and titles in

accordance with Mil-Std. Coat floor of mechanical room with a polyurethane coating to resist oil and chemical spillage and stains.

5.8.1.12 Fire Extinguishers: Fire extinguisher cabinets shall be provided complete with 10-pound ABC fire extinguishers. Cabinets shall be located in accordance with NFPA standards. Fire extinguisher cabinets shall be recessed and cabinet is to have factory-finished color to match adjacent wall with a clear, break glass door. Cabinet box shall be 18 gauge steel with baked enamel finish. Steel door and trim shall be one-piece construction with a continuous hinge and door shall be lockable. Trim shall be rolled edge and finished in white baked enamel. Door shall be 5/8-inch thick, one-piece hollow steel, full glazed steel frame with rubber roller catch and satin finish door handle, and white baked enamel finish. As a minimum, provide fire extinguisher cabinets in the following quantities: one each in Mechanical/Electrical room(s) and in each corridor. Cabinets shall be located in accordance with the provisions of NFPA 10, which may require more than those listed here due to travel distance.

5.8.1.13 Expansion Joint Covers: Expansion joint covers if required, shall be constructed of extruded aluminum with anodized satin finish for walls and ceilings and with standard mill-finish for floor covers and exterior covers.

5.8.1.14 Casework: All Casework shall meet the requirements of the Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program as set forth by the Architectural Woodwork Institute for architectural cabinets with high-pressure decorative laminate (HPDL) Quality shall be custom grade. See section below for solid surface countertops and solid surface countertops with integral sinks.

5.8.1.15 Blinds shall be provided at all exterior windows with the exception of entrance. Horizontal blinds shall conform to FS AA-V-00200, Type 11, 1 inch slats, except as modified below. Blind units shall be capable of nominally 190-degree partial tilting operation and full-height raising. Blinds shall be inside mount. Head Channel and Slats: Head channel shall be steel not less than 0.024 inch for Type II. Slats shall be aluminum, not less than 0.0080 inch thick, and of sufficient strength to prevent sag or bow in the finished blind. A sufficient amount of slats shall be provided to assure proper control, uniform spacing, and adequate overlap. Controls: The slats shall be tilted by a transparent tilting wand, hung vertically by its own weight, and shall swivel for easy operation. The □tilter control shall be of enclosed construction. All moving parts and mechanical drive shall be made of compatible materials, which do not require lubrication during normal expected life. The tilter shall tilt the slats to any desired angle and hold them at that angle so that any vibration or movement of ladders and slats will not drive the tilter and change the angle of slats. A mechanism shall be included to prevent over tightening. The wand shall be of sufficient length to reach to within 5 feet of the floor. Cord Manager shall be installed 54 inches above the finished floor. Intermediate Brackets: Intermediate brackets shall be provided for installation of blinds over 84 inches wide or over 100 inches long and shall be installed as recommended by the manufacturer.

5.8.1.16 Chair Rails and Corner Guards: Chair rails and corner guards shall be provided in areas as indicated above. Corner guards shall be used on all outside corners where vinyl wall covering or paint system occurs. Chair

rails shall be wood to match wood finishes throughout this facility. Corner guards shall be high impact, plastic in accordance with ASTM D 256. Corner guards shall be floor (top of wall base) to ceiling in rooms with 9'-0" or less ceilings. Exposed surfaces are unacceptable. To the maximum extent possible, the products shall be the standard products of a single manufacturer. Installation shall be in accordance with the manufacturer's written instructions.

5.8.1.17 Signage

5.8.1.17.1 Interior Signs: Interior signage shall be provided so that a visitor entering the facility would be able to use them to find a given destination. Interior signs are to be provided as follows:

5.8.1.17.1.1 Identification Signs. Signs shall be provided for all rooms and be compatible with the IDG. Office identification signs consist of a permanent header panel with the room number and an insert panel that identifies the occupant. The insert panel is a clear sleeve, which will accept a plastic insert with the name of the occupant. Permanent header panel dimensions: 9 inch x 3 inch. The insert panel dimensions: 9 inch X 3 inch overall sign dimensions: 9 inch x 6 inch. Room number shall be Helvetica medium, 1-1/2 inch numbers, flush left. Occupant name shall be upper and lower case Helvetica medium, 1/2 inch capital letter height, flush left. Insert area will accommodate two lines with a maximum of 21 tiles or characters per line.

5.8.1.17.1.1.1 Service identification signs are used to identify toilet rooms, shower rooms, and other like services. Service signs dimensions: 6 inch x 9 inch. The standard pictograph symbols shall be used. Service name shall be helvetica medium upper and lower case, 1 inch capital letter height, centered. Identification signs shall consist of a permanent header panel with the room number. There will be one insert panel. The panel will contain the room name. Overall sign dimension shall be 6 inch x 6 inch. Room number shall be helvetica medium, 1-1/2 inch numbers, flush left.

5.8.1.17.2 Interior Signage Products: Aluminum extrusions shall be at least 1/16 inch thick, and aluminum plate or sheet shall be at least 16 gauge, .051 inch thick. Extrusions shall conform to ASTM B 221; plate and sheet shall conform to ASTM B 209. Vinyl sheeting for graphics shall conform to MS MIL-M-43719, minimum 3 mil film thickness. Film shall include a precoated pressure sensitive adhesive backing (Class 3). Acrylic sheet shall conform to ASTM D 702, Type III. Changeable message strip plaque signs shall consist of acrylic or plexiglas back laminated to matte finish acrylic plastic face with message slots as detailed for insertion of changeable message strips. Individual .062 inch thick message strips to permit removal, change and reinsertion shall be provided. Signage that provides emergency information, general circulation directions or identification of rooms and spaces shall be tactile (perceptible to touch) and shall comply with ANSI A117.1, paragraph 4.27. Characters, symbols or pictographs on tactile signs shall be recessed or raised .032 inch minimum. Tactile letters and numbers shall be sans serif upper case. Tactile characters or symbols shall be at least 5/8 inch high, but no higher than a nominal 2 inches. Characters and symbols shall contrast with their background. Signage vendor shall provide lettering machine so user can change signage as needed.

5.8.1.17.3 Exterior Signs: Provide signs that comply with the Installation Design Guide and comply with sign standards provided in TM 5-807-10; "Signage". The contracting officer shall approve exterior signage.

5.8.1.18 Recessed Foot Grille: Recessed foot grille shall be carpet tread, mechanically secured in tread rails. Carpet shall be 100 percent nylon. Tread rails shall be spaced 1½" inches on center running perpendicular to traffic flow. Tread rails, keylock bars, and framing shall be extruded aluminum. Framing shall have standard mill finish. All grille and framing sections when installed shall be designed to support a minimum uniform load of 200 pounds per square foot. Drain pan application shall include a 16-gauge aluminum waterproof pan with a 2" inch drain and strainer; pan shall be securely attached to the bottom surface of the frame. Recessed floor grid shall be as manufactured by Arden Architectural Specialties, Inc., Balco Inc., Construction" Specialties Inc. or approved equal.

5.8.1.19 Solid Surfaces: Solid surface components shall be solid, non-porous polymer, not coated, laminated or of composite construction similar to "Santana" or approved equal. Materials shall have minimum physical and performance properties specified. Superficial damage to a depth of 1/10th inch shall be repairable by sanding or polishing. Material for toilet partitions shall be standard 1 inch thick. Material for Counter tops and windowsills shall be standard 1/2 inch thick. Lavatory/sinks shall be an integral part of the counter top. Lavatory/sinks shall be attached by a seamed under mount method. Material shall be a small scale, variegated pattern to the extent possible. Solid color solid surface shall not be used. Color should be in light to medium tones as dark colors tend to show scratches and water spots more readily. Lavatory counters and toilet partitions shall be of a color to accent the finish colors in the room in which the solid surfacing material is scheduled. Sheen shall be matte satin. Edge treatment shall be eased, rounded edges.

5.8.1.20 Vinyl Wall Covering: Vinyl wall covering shall be a vinyl coated woven or nonwoven fabric with mildew and germicidal additives and shall conform to FS CCC-W-408, Type 11, 13.1 to 24 ounces total weight per yard and width of 54 inches. Pattern and color of vinyl wall covering shall be as selected from manufacturer's standard colors and patterns.

5.9 INTERIOR FINISHES

5.9.1 Interior finishes and materials shall be specified with durability, maintenance, function, life cycle costs, code requirements and aesthetics being considered. Finishes and materials shall support the architectural elements and reflect the image and style of the using agency.

5.9.2 One species of wood and/or stain to represent one species of wood shall be specified throughout the entire facility. This encompasses doors, casework, chair rails, trim etc.

5.9.3 Submittal requirements for finishes and approvals are listed in Attachment Structural Interior Design, Submittal Requirements.

5.9.4 Upon the completion of construction, the Contractor shall provide and deliver at no additional cost, to the Contracting Officer, one percent extra of each color and texture of paver tile, ceramic tile, base, carpet, acoustical ceiling tile, wall covering and sheet vinyl of each total amount of each item used on the project.

5.9.5 Interior finishes shall be selected to meet the Federal Procurement Policy guidelines to comply with Section 6002 of the Resource Conservation and Recovery Act (RCRA), "Federal Procurement"; and Executive Order (EO) 12873, "Federal Acquisition Recycling and Waste Prevention, 1 May 1996 as well as ETL 1110-3-491, Sustainable Design for Military Facilities. (ETLs may be accessed at <http://www.usace.army.mil/inet/usace-docs/ena-tech~ltrs/>). Within parameter of performance, cost, aesthetics and availability, carefully select and specify building materials that limit impacts on the environment and occupant health. Building shall be free of asbestos containing material pursuant to OSHA asbestos regulations governing building owners, 29 CFR Part 1926, including Section 1926 (k). Limit VOC content in adhesives. At a minimum all adhesives must meet the Air Quality Management rules. Limit the VOC content in architectural sealants (material with "adhesive" characteristics used as filler; not material used as a "coating") At a minimum, all sealants must meet the limits of Regulation 8, Rule 51 of the Bay Area Air Resources Board. Limit the VOC content in paints and coatings. At a minimum all paints and coatings must meet the requirements of Rule 1113, Mojave Desert Air Quality Management District. Consider using the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Building Rating System as an outline of environmental performance targets for the project. (U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Building Rating System can be accessed at: <http://www.usgbc.org/programs>. Elements to be considered during design and specification are:

5.9.5.1 Sustainable Design: The contractor shall comply with and provide for the requirements of sustainable design with a minimum design target of "Bronze Spirit".

5.9.5.2 Elimination of virgin material requirements

5.9.5.3 Use of recovered materials

5.9.5.4 Reuse of products

5.9.5.5 Life cycle costs

- Recyclability

- Environmental preferability

- Waste prevention, including toxicity reduction

- Disposal

- Buy locally to minimize impact of transporting

5.10 INTERIOR COLORS

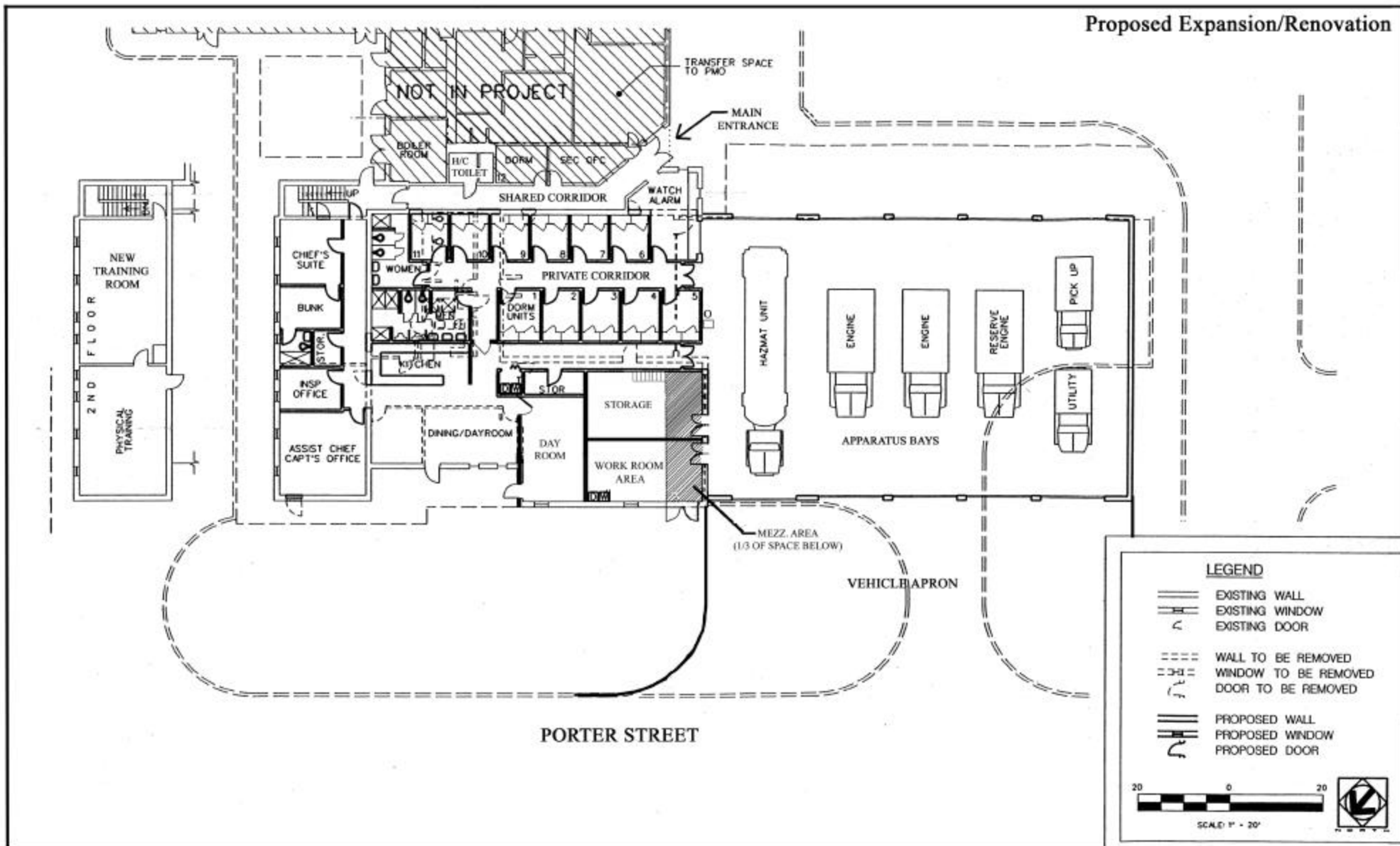
5.10.1 Finish and color selection shall be appropriate to the interior design intent to support the occupants, their activities and their customers.

5.10.2 Permanent finishes include paver tile, ceramic tile, chair rails, plastic laminates, solid surface materials, sheet vinyl and horizontal blinds.

5.10.3 Non-permanent finishes include carpet, paint and other items that are relatively easy and inexpensive to replace.

5.10.4 Colors and finishes shall be selected based on durability, maintenance, life cycle costs, code requirements, appearance and functional considerations. Variegated finishes and patterns are recommended to be implemented to the maximum extent possible as solids show wear and tear. Integral color and color through finishes shall be specified where applicable.

5.10.5 The colors and textures specified shall not date the facility and shall create an interior that will remain aesthetically pleasing over time. Finishes and materials shall support the architectural elements and reflect the image and style of the using agency.



ATTACHMENT 1

CHAPTER 6

STRUCTURAL

6.0 STRUCTURAL

6.1 STRUCTURAL CRITERIA

The structural criteria established herein shall be used for structural loading, design and installation of all structural systems and foundations, including manufacturing, erection, supervision, testing, and quality assurance of the completed installation of the buildings. All structural calculations shall be checked and initialed as such by a registered professional engineer other than the original design engineer. Drawings and calculations shall be stamped by a registered professional engineer. All references contained herein to minimum requirements shall not be construed to mean that no additional calculations are required. If the structural design requires more than the minimum requirements, then the structural design shall govern. The structural work generally consists of design, using the DESIGN CRITERIA and DESIGN LOAD CRITERIA below, and construction of but not limited to:

- a. Foundations.
- b. Load bearing and non-load bearing walls.
- c. Vertical framing members.
- d. Horizontal framing members, including roof decks and diaphragms, roof beams, joists and trusses.
- e. Interconnection details including all fastening requirements.
- f. Special conditions, such as expansion, construction, and control joints.
- g. Attachment provisions for architectural, mechanical, and electrical elements.
- h. Site fencing structure and foundations.
- i. Retaining walls
- j. Mechanical/Electrical equipment concrete pad

6.2 DESIGN CRITERIA

Design shall meet the latest edition of the following criteria.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 318	Building Code Requirements for Reinforced Concrete
ACI 302	Guide for Concrete Floors and Slab Construction

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

Manual of Steel Construction, 9th edition
Manual of Steel Construction, LRFD

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	Minimum Design Loads for Buildings and Other Structures
--------	---

AMERICAN WELDING SOCIETY

Welding Handbook
US AIR FORCE FIRE STATION DESIGN GUIDE

ARMY TECHNICAL INSTRUCTIONS

TI 809-02	Structural Design Criteria for Buildings
TI 809-04	Seismic Design for Buildings
TI 809-07	Design of Cold-Formed Loadbearing Steel Systems and Masonry Veneer/Steel Stud Walls

ARMY TECHNICAL MANUALS

TM 5-853-1	Security Engineering Project Development
TM 5-853-2	Security Engineering Concept Design
TM 5-853-3	Security Engineering Final Design
TM 5-855-1	Design & Analysis of Hardened Structures to Conventional Weapons Effects
TM 5-1300	Structures to Resist the Effects of Accidental Explosions

UNIFIED FACILITIES CRITERIA

UFC 1-200-1 Unified Facilities Criteria (UFC)

DEPARTMENT OF DEFENSE

Department of Defense Interim Antiterrorism Construction Standards

STEEL DECK INSTITUTE

Diaphragm Design Manual

STEEL JOIST INSTITUTE

Standard Specifications Load Tables and Weight Tables for Steel Joists
and Joist Girders

Design methods and stress allowances or load factors for the various structural materials shall be in accordance with the current editions of the codes and specifications listed above. Recommendations made in the codes, specifications and industry standards in this paragraph are requirements of this RFP, unless specified otherwise in this RFP.

6.3 DESIGN LOAD CRITERIA

Minimum roof live load:	20 psf (no reduction)
Dead load:	Actual
Ground snow load:	30 psf
Wind speed:	90 mph
Floor live load:	In accordance with ASCE 7 or the User's request (whichever is greater)
Frost penetration	29 inches
Category	IV
Importance factor	I = 1.15
Seismic factors	Ss=0.19, S1=0.062
Storage floor live load at mezzanine level in existing apparatus	

bay: In accordance with ASCE 7 or the User's request (whichever is greater)

6.4 FOUNDATIONS

A geotechnical report is attached and provides information on the soil conditions at the project site. The report provides information for bidding purposes only. The final geotechnical design analysis for the foundations is the responsibility of the design/build contractor. The contractor is responsible for performing additional exploration and testing as necessary to support his design of the foundation system. The geotechnical design must be performed by a geotechnical engineer in accordance with good geotechnical practice and shall provide an adequate level of protection against general shear failure of the foundation or excessive total and/or differential foundation settlement. Refer to the geotechnical report for additional requirements.

6.5 SEISMIC DESIGN

Seismic design shall be in accordance with Army Technical Instructions, TI 809-04, Seismic Design for Buildings. This document references NEHRP provisions for the determination of site-specific seismic accelerations and prescribes the method of design force derivation.

6.6 LATERAL RESISTANCE

Walls, when used or required for lateral resistance to wind or earthquake, shall be considered bearing walls and shall have full foundations.

6.7 FORCE PROTECTION

5.7.1 Force protection design shall be in accordance with TM 5-853-1, TM 5-853-2, TM 5-853-3, and the Interim Department of Defense Antiterrorism/Force Protection Construction Standards.

6.8 SELECTION OF STRUCTURAL SYSTEM

5.8.1 The overall structural system shall be selected based on durability, maintainability, cost effectiveness, and flexibility for future renovation.

6.9 GENERAL DESIGN CRITERIA

6.9.1 The design drawings shall contain in the General Notes a list of the design loading criteria, a list of the strengths of the engineering materials used, the design soil values and any other data that would be pertinent to remodeling and/or future additions.

6.9.2 Walls mostly below grade that are supported laterally by diaphragms at or near the top and bottom, shall be designed using loading based on at rest soil pressures. All masonry walls below grade (below first floor finish floor) shall be solid grouted construction.

6.9.3 Diaphragms shall have continuous chord members on all edges and shall have direct positive connection for transferring load to all members of the main lateral force resisting system.

6.10 CONCRETE DESIGN

6.10.1 The minimum concrete strength shall have at least a compressive strength of 3000 psi at 28 days.

6.10.2 Concrete Materials shall conform to the following:

- a. Cement: ASTM C 150, Type I-II Portland cement.
- b. Fine Aggregate: ASTM C 33.
- c. Coarse Aggregate: ASTM C 33.
- d. Air-Entraining Admixture: ASTM C 260.
- e. Flowing Concrete Admixture: ASTM C 1017, Type 1 or 2.
- f. Fly Ash: ASTM C 618, Class F.
- g. Calcium Chloride will not be permitted.

6.10.3 Ready-Mix Concrete shall conform to ASTM C 94.

6.10.4 Slabs-on-Grade

6.10.4.1 Slabs supported on grade will be a minimum thickness of 4 inches and shall contain a minimum of 0.1 percent welded wire mesh reinforcement in each direction placed at 1½" from the top of the slab.

6.10.4.2 Horizontal runs of conduits and pipes will not be embedded in Slabs supported by ground. Vertical penetrations will conform to ACI 318. Aluminum conduit and pipes will not be embedded in any concrete structure.

6.10.4.3 Refer to TI 809-02, Chapter 5, for additional slab-on-grade requirements.

6.10.4.4 See table below for vehicle type and weights information.

Unit	Year/Make	Model	Weight	Wheelbase	Length
Engine 501	1997 Pierce	1250 GPM Pumper	34,560 lbs	170"	27'4"
Engine 502	1994 Pierce	1250 GPM Pumper	34,800 lbs	174"	29'
Engine 503	1989 MACI	1000 GPM CFR	29,340 lbs	150"	25'
Hazmat 50	1989 E-One	18ft Squad Body	22,740 lbs	176"	27'4"
Utility 50	1999 Chev	Utility Body			
Car 50	1999 Chev	Suburban			
General Purpose	1997 Chev	Tahoe			
General Purpose	1998 Dodge	Durango			
Future		Ladder Truck	65,000 lbs	224"	40'

			lbs		
--	--	--	-----	--	--

6.11 MASONRY DESIGN

6.11.1 Masonry construction shall conform to UFC1-200-1.

6.11.2 All mortar used on this project shall be type "S" mortar.

6.11.3 Installation of brickwork shall comply with the latest edition of the Brick Institute of America Technical Notes No. 28; Brick Veneer, New Construction.

6.11.4 Concrete masonry units shall have a minimum compressive strength of 2000 psi on net area (1000 psi on gross area) at 28 days.

6.11.5 Unreinforced masonry construction shall not be allowed.

6.12 STRUCTURAL STEEL DESIGN

6.12.1 The detailing of structural steel framing, if any, including connections, shall be complete. All weld types, weld, bolting layouts; bolt sizes, connection plates and members sizes and locations and stiffener plates sizes and locations shall be shown. Simple beam shear connections shall not require detailing if the beam end reactions are noted on the drawings and the drawings indicate that the connections are to be detailed by the fabricator.

6.12.2 All members, elements and connections that are a part of the main lateral force-resisting system must be completely detailed.

6.12.3 Fabrication of conventional structural steel for this project shall be performed by an AISC certified fabricating shop. In the event that a metal building system is utilized for any of the buildings on this project, the metal building manufacture and fabrication facility must also be AISC certified certification category MB.

6.13 LIGHT GAGE STEEL FRAMING AND TRUSSES

TI 809-07, Design of Cold-Formed Loadbearing Steel Systems and Masonry Veneer/Steel Stud Walls addresses prescriptive design for cold-formed metal roof trusses, indicating that member specific design and detailing is required for each truss configuration proposed, and requiring that complete design documentation be provided for each truss type/configuration specified, including member properties, material strengths, connection details, etc.

CHAPTER 7

HVAC

7.0 HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

Project consists of renovation of the air and hot water distribution systems in the existing fire station area and the installation of new heating and ventilating systems in the new apparatus building (refer to chapter 4, ARCHITECTURAL, for locations). During the renovation, openings of the ductwork and piping shall be capped immediately so that the central air systems will be able to continuously serve rest of the building. New systems shall be designed and constructed in accordance with the following requirements:

7.1 GENERAL REQUIREMENTS

7.1.1 Design Standards

Heating, ventilation and air conditioning systems shall comply with the latest provisions, unless other indicated, of the following standards and specifications:

- a. TI 800-01, Technical Instructions - Design Criteria
- b. TI 800-03, Technical Requirements for Design-Build
- c. TI 809-04, Technical Instructions - Seismic Design for Buildings
- d. TI 810-10, Mechanical Design - HVAC
- e. TI 810-11, HVAC Control Systems
- f. TM 5-785, Weather Data
- g. TM 5-805-4, Noise and Vibration
- h. ANSI Standards
- i. ASHRAE Handbooks
- j. ASHRAE Standard 62-2001, Ventilation
- k. ASHRAE Standard 90.1-2001, Energy Efficient Design of New Buildings
- l. ASME Standards
- m. ASTM Standards
- n. UL Standards
- o. NFPA Standards
- p. NFPA 90A, Air Conditioning and Ventilation Systems
- q. OSHA Safety and Health Standards

q. SMACNA Manuals and Guides

r. NIOSH Guidance for Protecting Building Environments from Airborne Chemical, Biological, or Radiological Attacks

7.1.2 Submittals

Submittals shall be in accordance with Section 01330, Submittal Procedures. HVAC system construction shall not begin until HVAC final design has been reviewed and cleared for construction by the government. All submittals shall include adequate descriptive literature, catalog cuts, and other data for the government to ascertain that the proposed equipment and materials comply with this RFP.

7.1.3 Equipment

All equipment shall be factory packaged and tested. Use products of one manufacturer where two or more items of the same kind of equipment are required. Equipment efficiencies shall meet the minimum efficiency requirements indicated from ASHRAE 90.1-2001, unless indicated otherwise in this RFP.

7.2 Design Criteria

7.2.1 Outdoor Conditions (Temperatures indicated are dry bulb unless otherwise indicated.)

7.2.1.1 General -

Latitude - 39 degrees, 3 minutes
Longitude - 77 degrees, 43 minutes
Elevation - 294 feet
Degree Days -
 Heating - 5087
Daily Range - 22 degrees F

7.2.1.2 Heating Season

Design Temperature - 12 degrees F
Design Temperature for Outside Air Coils - -5 degrees F

7.2.1.3 Cooling Season

Design Temperature - 91 degrees F
Wet Bulb - 75 degrees F

7.2.2 Indoor Heating and Cooling Conditions

a. Offices, living, kitchen, dining, and day rooms:

Summer - 75 degrees F, 50% RH maximum
Winter - 68 degrees F, 30% RH minimum

b. Mechanical Room:

Summer - ventilate only, 10 degrees F above ambient
Winter - 55 degrees F

c. Watch/Alarm Room:

Summer/Winter - 75 degrees F, 50% RH maximum (Humidification shall be provided).

d. Toilet Rooms:

Summer - None (Indirect Cooling from adjacent spaces)
Winter - 68 degrees F

e. Janitor Closet:

Summer - None (Indirect Cooling from adjacent spaces)
Winter - None (Indirect Heating from adjacent spaces)

g. Storage:

Summer - not to exceed 96 degrees F
Winter - 55 degrees F

h. Apparatus Bays:

Summer - not to exceed 96 degrees F
Winter - 55 degrees F

i. Training Rooms:

Summer - 75 degrees F - 50% RH plus/minus 5%
Winter - 68 degrees F - 30% RH Minimum

j. Work Room:

Summer - Not to exceed 96 degrees F.
Winter - 60 degrees F.

k. Corridors:

Summer - 75 degrees F.
Winter - 68 degrees F.

7.2.3 Ventilation

7.2.3.1 General

The following definitions apply: recirculated air is room air that can be returned for reuse. Non-recirculated air is room air that cannot be returned for reuse. All areas located on the exterior wall shall be provided with positive pressure to prevent infiltration.

7.2.3.1.1 Recirculated air from offices, living rooms, dining/kitchen area, dayroom, corridor, training rooms, and watch/alarm room

7.2.3.1.2 Non-recirculated air (Exhausted air) from toilet rooms and Janitor's Closet.

7.2.3.1.3 Kitchen

Ventilation for hoods shall be designed for vapor hoods and in accordance with NFPA 96 for grease hoods. Exhaust for grease and vapor hoods shall be discharged vertically through the roof using a hinged, upblast exhaust fan. The exhaust for the grease and vapor hoods shall be enclosed in a 2 hour rated fire separation. The termination of the exhaust shall be at least 10 feet from air intakes.

7.2.3.2 Minimum outside air quantities

- a. Offices - 20 cfm per occupant.
- b. Living Rooms - 30 cfm per room
- c. Kitchen and dining area: 20 cfm per occupant.
- d. Day rooms: 20 cfm per occupant.
- e. Watch/Alarm Room - 20 cfm per occupant.
- f. Toilet Rooms - 50 cfm per water closet or urinal.
- g. Janitor closet - 50 cfm
- h. Storage - 0.15 cfm per square foot.
- i. Workroom - 1.5 cfm per square foot.
- j. Training Rooms - 20 cfm per occupant.
- l. Mechanical Room - cfm shall be based on combustion and temperature reduction requirements.
- m. Corridors - 0.1 cfm per square foot

7.2.4 Filtration of Circulated Air

The existing air filters in the air handling units are adequate for air filtration.

7.2.5 Heating and Cooling Loads

Submit computer program generated heating and cooling loads including building air balance (positive pressure to be provided to preclude any infiltration in the office and living areas) to substantiate design guidelines were met and to size the necessary HVAC equipment. Use a nationally recognized heating and cooling load program such as Trane Trace 700, DOE-2.1E or other program that performs 8760 hourly calculations.

7.2.6 Special Equipment Loads

Obtain heat gain information from the manufacturer for the equipment. Where no information is available, use ASHRAE Fundamentals. The following is, but not limited to, a list of possible equipment (refer to room description for location of equipment):

- a. Copiers
- b. Faxes
- c. Laser Printers
- d. Computers/Monitors
- e. Televisions
- f. VCRs/DVDs
- g. Communication Equipment
- h. Cocking range
- i. Cocking Grill
- j. Refrigerator
- k. Oven
- l. Washer and Dryer
- m. Vending machines
- n. Water cooler
- o. Microwaves

7.2.7 Sound and Vibration Criteria

7.2.7.1 General

ASHRAE Applications Handbook and TM 5-805-4 shall be used for selecting heating and air conditioning equipment, ductwork and air supply devices.

7.2.7.2 Room Requirements

The following NC requirements apply:

Offices, living rooms, and dayroom.	NC-30
Training Rooms	NC-35
Kitchen, dining area, and corridor, workroom	NC-45

7.3 Source of Heating and Cooling

7.3.1 Heating - Heating shall be provided by natural gas. The existing gas meter is at the mechanical room. If required, a new meter may be installed at the apparatus building.

7.3.2 Cooling - Direct Expansion (Dx) systems were used in the existing A/C systems. No additional cooling capacity required.

7.4 Occupancy

Refer to Chapter 5, architectural, for occupancy and hours of operations, and equipment to be included, etc. No reduction in the heating load shall be taken for the internal heat gain due to lighting, equipment and occupancy. People sensible and latent loads for all areas shall be based on light office work conditions as indicated in ASHRAE.

7.5 Antiterrorist and Security Measures

7.5.1 A shutoff switch for the air handler units shall be located in the watch/alarm room for easy access by on duty personnel in the building. See also the NIOSH Publication, Protecting Building Environments for Airborne

Chemical, Biological, or Radiological Attacks, for additional requirements. This publication can be obtained by calling 1-800-356-4674 or E-mail at pubstaft@cdc.gov.

7.5.2 Utilities shall not be located on external walls.

7.5.3 All outside air intake louvers shall be at least 10 feet above grade.

7.6 Testing, Adjusting and Balancing (TAB)

TAB of HVAC systems shall meet the requirements of the UFGS specification 15990A.

7.7 Commissioning

The commissioning of the HVAC system shall meet the requirements of UFGS specification 15995.

7.8 Seismic

All equipment shall be seismically protected in accordance with UFGS 13080, Seismic Protection for Miscellaneous Equipment, TI 809-04, Seismic Design for buildings, and UFGS 15070A, Seismic Protection for Mechanical Equipment.

7.9 Room Systems

Generally, systems can be divided into two areas, the renovated area and the expanded apparatus bays. The existing equipment capacity is adequate for heating and air conditioning the renovated area. A new heating and ventilation system shall be added for the new expanded apparatus bays.

7.9.1 Renovated area

7.9.1.1 The renovated spaces of the existing building are air conditioned by two roof top air handling units. One unit serves the original building and the other serves the previous addition of a two stories section. Both are variable air volume (VAV) system with DX cooling and bypass. The former is a recent replacement with hot water preheating coil, the later is heated with a natural gas furnace. They are functioning well and adequate in capacity. Therefore, only new air redistribution is required in the renovated area.

7.9.1.2 Except the storage, workroom and bathrooms, Variable air volume system shall be used for air distribution. Air shall be supplied and returned to the existing air handling units. Reheat coils shall be provided to each of the VAV terminals. Each room shall be provided with a thermostat for individual room temperature control. All ceiling diffusers grilles, and thermostat shall be new.

7.9.1.3 Separate heating and ventilation systems shall be provided for the storage and workroom. Heat source may be either hot water or natural gas from the existing mechanical room.

7.9.2 New expanded apparatus bays

7.9.2.1 Natural gas fired infrared radiant heaters with temperature controls shall be provided between the bays for heating. Nature gas may be run from the existing meter at the mechanical room or, if the capacity of the existing

meter is limited, a new gas meter to be installed at the bay area (refer to Chapter 8, PLUMBING). Exhaust from the heaters shall be discharged to the outside of the building.

7.9.2.2 Provide ventilation system for space fume and heat deduction.

7.9.2.3 A vehicle exhaust system shall be provided. System shall include central exhaust fan, exhaust manifold, and hose reels. Each hose reel shall be equipped with tail pipe adaptor and emergency disconnection mechanism and shall be located overhead at the center of the interspaces between the bays. System shall be provided with pressure and temperature sensors for exhaust fan activation.

7.9.3 Exhaust

7.9.3.1 Locations

Exhaust fans for toilet, kitchen, vehicle exhaust and miscellaneous rooms shall be located on the roof.

7.10 Equipment and Materials

Final specification to be developed in accordance with the UFGS specifications and as indicated in this RFP.

7.11 Operation and Maintenance (O&M) Manuals

Complete O&M manuals and training for all HVAC equipment shall be provided as indicated in each technical section of the UFGS specifications.

(Chapter End)

CHAPTER 8 PLUMBING

8.0 PLUMBING

Plumbing work consists of renovating plumbing systems in the existing fire station and adding plumbing systems in a new expanded apparatus building (Refer to sketches in Chapter 5 for area locations). Renovation includes removing all plumbing fixtures, floor drains, and piping to fixtures. Openings of pipe shall be capped immediately so that the plumbing system in the un-renovated areas is operable. All components to be removed shall be removed out of the building. Abandoned in place is not permitted. The new systems shall be designed and constructed in accordance with the requirements below:

8.1 GENERAL REQUIREMENTS

Complete plumbing and gas piping systems will be provided for the building. The term "plumbing installation" as used herein includes water service including all pipes, fixtures and equipment. A system includes all connections in the building to a point 5 feet outside the building. The plumbing and gas piping systems shall be designed in accordance with the following criteria and specifications unless specified otherwise herein.

- a. International Plumbing Code
- b. Technical Manual (TM 5-810-5) Plumbing
- c. ASHRAE Systems and Applications
- d. Plumbing and Drainage Institute (PDI-WH-201) Water Hammer Arrestors
- e. Comprehensive National Energy Policy Act (PL. 102-486)
- f. American National Standard for Accessible and Useable Buildings and Facilities (CABO A117.1)
- g. Technical Instructions Design Criteria (TI 800-01)
- h. Architectural and Engineering Instructions (AEI) Design Criteria.
- i. Instructions and Guidance to Architects and Engineers Military Construction (Mechanical)
- j. American Gas Association (AGA) - Plastic Pipe Manual for Gas Service.
- k. National Fire Protection Agency (NFPA) 54 - National Fuel Gas Code.
- l. Emergency Eyewash and Shower Equipment - ANSI Z358.1 (1998)

8.1.1 Materials and Equipment

Materials and equipment shall be standard catalog products of manufacturers regularly engaged in production of such materials. All selected equipment shall be manufacturer's latest standard model.

8.1.2 Seismic Requirements

All equipment shall be seismically protected in accordance with UFGS 13080A, Seismic protection for Miscellaneous Equipment; and UFGS 15070A, Seismic Protection for Mechanical Equipment.

8.1.3 Submittals

Submittals shall be provided by the Contractor to the Contracting Officer for approval in accordance with Section 01330, Submittal Procedures. All submittals shall include adequate descriptive literature, catalog cuts, and other supporting data showing compliance with this RFP.

8.1.3.1 Calculations, Drawings, and Specifications

The existing water supply for plumbing facility is adequate. Installation of the plumbing equipment shall not begin until such time that all the calculations, drawings, and specifications are returned stamped "approved."

8.2 PLUMBING FIXTURES AND EQUIPMENT

8.2.1 Plumbing Fixtures, General

Fixtures shall be water conservation type, in accordance with NAPHCC-1. Fixtures shall be provided complete with fittings. All fixtures, fittings, and trim in a project shall be from the same manufacturer and shall have the same finish. Faucets shall be equipped with high efficiency faucet aerators. All faucets, faucet handles, and miscellaneous trim shall be of metal construction with a polished chrome finish. Installation of fixtures for use by the physically handicapped shall be in accordance with CABO A117.1.

8.2.1.1 Lavatory/Sink Faucets

Faucet shall be center set single-control type with seals and seats combined in one replaceable cartridge sized to be interchangeable among similar fixtures such as lavatories or having replaceable seals and seats removable either as a seat insert or as a part of a replaceable valve unit. Water flow for manually operated faucets shall not exceed 2.5 gpm.

8.2.1.2 Countertop Lavatories

Lavatory counter tops and sinks shall be solid surface, polymer molded, integral with counter top, and have a continuous seamless mount. The lavatory shall be the oval type with a minimum size of 19 inches by 16 inches. Lavatories shall have pop-up drain stoppers.

8.2.1.3 Wall Mounted Lavatories

Lavatories shall be manufacturers standard sink depth, vitreous china, rectangular, wall mount, straight back and shall comply with ASME A112.19.1M or ASME A112.19.2M. Lavatories shall have a pop-up drain stopper, and shall be handicapped accessible with sensor activated valve.

8.2.1.4 Water Closets

Water closets shall be the floor-mounted elongated vitreous china bowl type with top supply spud and white closed-front seat and cover. Flushometer valve shall be large diaphragm type with non-hold open feature, backcheck angle control stop, and vacuum breaker. The minimum upper chamber inside diameter shall be not less than 2.625 inches at the point where the diaphragm is sealed between the upper and lower chambers. The maximum water use per flush is 1.6 gallons.

8.2.1.5 Urinals

Urinals shall be the wall hang vitreous china type with integral trap and extended shields. Top supply connection and back outlet Flushometer Valve shall be Similar to Flushometer Valve for water closet. The maximum water use shall be 3.8 liters 1 gallon per flush.

8.2.1.6 Showers

Showerheads shall be adjustable spray type and shall include a non-removable, tamperproof device to limit water flow to 2.5 gpm. Control valves shall be copper alloy and have metal integral parts of copper alloy, nickel alloy, or stainless steel. Valves shall be thermostatic mixing type. Cabinet shall be free standing cabinet, single unit with receptor; 36 inches wide by 36 inches deep, acrylic fiber construction. Cabinet shall include curtain rod, trim, and concealed fittings. Shower light fixture shall be furnished from the shower unit manufacturer.

8.2.1.7 Emergency Eye Wash

Provide emergency eye wash in the apparatus building (refer to sketches in Chapter 4 for location). Fountain, ANSI Z358.1 eye wash, wall mounted self-cleaning, non-clogging eye and face wash with quick opening, full-flow valves, corrosion-resisting steel eye and face wash receptor. Unit shall deliver 3 gpm of aerated water at 30 psig flow pressure, with eye and face wash nozzles 33 to 45 inches above finished floor.

8.2.1.8 Electric Water Coolers

Electric water coolers shall be self contained, conform to ARI 1010, use one of the fluorocarbon gases conforming to ARI 700 and ASHRAE 34 which has an ozone depletion potential of .05 or less. Min capacity shall be 8 gallons per hour at 50° F with an inlet water temperature of 80° F, while residing in a room environment of 90° F. Unit shall have self closing valves with automatic stream regulators, flow control capability, push button actuated. Exposed surfaces of stainless steel shall have a no. 4 general polish. Spouts shall provide a flow of water at least 4 inches high so as to allow the insertion of a cup or glass under the flow of water.

8.2.1.9 Electric Water Coolers, Handicapped

Handicapped type shall be provided. Unit shall be ADA compliant. Other features shall be as specified above in paragraph: Electric Water Coolers.

8.2.1.10 Kitchen Sink:

Ledge back with holes for faucet and spout double bowl 42 x 21 inches stainless steel ASME A112.19.3M. Faucets shall meet the requirements of NSF 61, Section 9. Cast or wrought copper alloy. Aerator shall have internal threads. Flow shall be limited to 0.25 gallon per cycle at a flowing water pressure 80 psi if a metering device or fitting is used that limits the period of water discharge such as a foot switch or fixture occupancy sensor. If a metering device is not used, the flow shall be limited to 2.5 gpm at a flowing water pressure of 80 psi. The handle shall be Cast copper alloy, wrought copper alloy, or stainless steel single lever type. The drain assembly: Plug,

cup strainer, crossbars, jam nuts, washers, couplings, stopper, etc., shall be copper alloy or stainless steel.

8.2.1.11 Service Sinks

Service sinks shall be provided for the janitor closets and apparatus building. Sink shall be enameled cast iron ASME A112.19.1M, copper alloy or stainless steel ASME A112.19.3M trap standard 24 inches wide x 20 inches deep splash-back 9 inches high. Faucet and Spout - Cast or wrought copper alloy, with top or bottom brace, with back-flow preventer. Faucets shall have replaceable seat and the washer shall rotate onto the seat. Handles shall be lever type. Strainers shall have internal threads. Drain Assembly - Plug, cup strainer, crossbars, jam nuts, washers, couplings, stopper, etc., shall be copper alloy or stainless steel. Trap - Cast iron, minimum 3-inch diameter.

8.2.1.12 Floor Drains and Grated Trenches

Floor drains shall be provided in toilets with 3 or more water closets and in areas with condensate producing equipment. Floor drains shall be cast iron with integral seepage pan, and adjustable perforated or slotted chromium-plated bronze, nickel bronze, or nickel brass strainer. All floor drains shall be automatically trap primed. Grated trenches shall be provided at the inlet and outlet of apparatus bays. Trenches shall be cast iron, polymer concrete, or fiberglass providing safe, fast and effective removal of liquid. Grade shall be cast or ductile iron rated for the concerned apparatus wheel load. Trenches shall be sloped to an outlet connecting to the drain piping.

8.2.2 Air Compressors

Existing air compressors shall be relocated to the far end wall of the new apparatus building. Compressors shall be set on concrete pad at least 4 inches above floor with anchor bolts. Compressors shall be provided with floor drains and air intakes with muffler from outdoor.

8.2.3 Gas Regulator/Meter Assembly

The contractor shall determine either another gas regulator/meter assembly is required by analyzing the adequacy of the existing assembly's capacity for the additional heating load of the new apparatus building. If required, regulator/meter assembly shall be sized for the requirement of the new apparatus building and shall be located outside of the apparatus building. The regulator/meter assembly will be provided and installed by Frederick Gas Company on a concrete pad to be furnished by the contractor.

8.3 PIPING (NOT INCLUDING GAS PIPING)

Pipe sizes shall be per the National Standard Plumbing Code. The plumbing systems shall conform to the requirements of the National Standard Plumbing Code. Flow velocities in water pipe shall not exceed 8 feet per second. All piping shall be sloped to permit complete drainage and be properly supported with allowances for expansion and contraction. Water supply piping shall not be buried under concrete floors except where other methods of installation are impracticable. All piping with the exception of individual fixture run-outs shall be completely concealed. Overhead piping shall be concealed above ceilings. Vertical stacks and risers shall be concealed in pipe chases or properly protected from damage. All work shall be installed so as not to interfere with other mechanical and electrical equipment.

8.3.1 Domestic Water Piping

All above grade water piping shall be installed inside the building thermal envelope.

8.3.1.1 Above Ground Water Piping

All above ground piping shall be Type L hard-drawn copper. Fittings for hard-drawn copper shall conform to ANSI B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

8.3.1.2 Below Ground Water Piping

All underground piping shall be seamless copper water tube, ASTM B 88 type K with brazed joints, or type F soft copper without joints. Joints under the slabs are prohibited. Under slab supply piping shall be limited to building service entrance only.

8.3.1.3 Wall Hydrants

Wall hydrants shall be provided on the exterior of the building in accordance with TM 5-810-5.

8.3.1.4 Apparatus service water piping

Hose connections of apparatus service water shall be provided in the apparatus building on each column. The connection shall be ¾" diameter, quick connection type. The connection shall be 4 feet above floor with an up-stream shut off valve. A hose hook on the column shall be provided below the hose connection.

8.3.2 Sanitary Piping

All sanitary piping shall be concealed. Each fixture and piece of equipment, except water closets and urinals, requiring connection to the drainage system shall be provided with a trap.

8.3.3 Drain, Waste, and Vent Piping

Drain, waste, and vent piping shall be in accordance with ASTM D 2661.

8.3.4 Roof Drainage

Design of roof drainage shall be in accordance with the National Standard Plumbing Code.

8.3.5 Compressed Air Piping

Compressed air manifold shall across the bays. A hose reels with hose and hand valve shall be provided overhead at the center of each of the interspaces between the pays that each hose may serve the apparatus in the adjacent two bays. A shutoff valve shall be provided between the air manifold and each hose reel.

8.4 GAS PIPING

By the contractor's evaluation determines the requirement of a new gas meter. Base utility site plan shows an existing 4 inch gas on the south side of Porter Street about 30 feet from the building. If required, the gas company will make the connection to the existing gas line. The gas company will provide and install the new gas line and meter set assembly. The contractor shall provide all piping required after the meter. Contractor shall provide

design calculations for sizing of pipe. Pipe size shall be based on building demand. Installation of the gas system shall be in accordance with NFPA 54, the National Fuel Gas Code, UL-06, the Gas and Oil Equipment Directory, ASME B31.8 - 1999 Edition, and all local/seismic codes. The Baltimore District Corps of Engineers will negotiate the execution and administration of the utility contract.

8.4.1 Gas Connections

Final connections for gas equipment and appliances shall conform to ANSI Z21.45.

8.5 INSULATION

All domestic hot water pipes and all exposed traps shall be insulated in accordance with UFGS 15080.

(Chapter End)

CHAPTER 9

FIRE PROTECTION

9.0 FIRE PROTECTION

9.1 Codes, Products, and Installation Standards.

9.1.1 Design Standards:

The fire protection systems shall be designed in accordance with the following codes, criteria and specifications unless otherwise specified herein (most recent edition):

- a. NFPA (National Fire Protection Association) 01; Fire Prevention Code
- b. NFPA (National Fire Protection Association) 10; Portable Fire Extinguishers
- c. NFPA (National Fire Protection Association) 13; Installation of Sprinkler Systems
- d. NFPA (National Fire Protection Association) 14; Installation of Standpipe and Hose Systems
- e. NFPA (National Fire Protection Association) 17A; Installation of Wet Chemical Extinguishing Systems
- f. NFPA (National Fire Protection Association) 20; Installation of Centrifugal Fire Pumps
- g. NFPA (National Fire Protection Association) 24; Installation of Private Fire Service Mains and Their Appurtenances
- h. NFPA (National Fire Protection Association) 70; National Electric Code
- i. NFPA (National Fire Protection Association) 72; National Fire Alarm Code
- j. NFPA (National Fire Protection Association) 90A; Installation of Air Conditioning and Ventilation Systems
- k. NFPA (National Fire Protection Association) 101; Life Safety Code
- l. Other NFPA standards as applicable
- m. UL (Underwriters' Laboratories) Standards as appropriate
- n. FM (Factory Mutual) Standards as appropriate
- o. Americans with Disabilities Act
- p. Uniform Federal Accessibility Standard
- q. International Building Code
- r. Uniform Fire Code
- s. Military Handbook 1008C; Fire Protection for Facilities Engineering, Design and Construction
- t. TI (Technical Instructions) 800-01

9.1.2 Products:

Material and equipment shall be a standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years (unless noted otherwise) prior to bid opening.

9.1.3 Installation Standards:

The installation of electrical equipment shall comply with the latest edition of the National Electrical Code and the National Electrical Safety Code (ANSI C2).

Major components of the fire alarm system shall be provided with laminated plastic (1/4 inch letters on black outer layers with white core) identification.

Detail drawings, shall be reviewed by a Registered Professional Engineer with verification of experience and at least 4 years of current experience in the design of the fire protection and detection systems.

Fire Protection, Fire Suppression, Fire Detection, and Life Safety Systems design, specifications, and drawings shall be stamped, signed and dated by a Fire Protection Engineer in accordance with MIL-HNDK-1008C.

9.2 ADDRESSABLE FIRE ALARM SYSTEM

9.2.1 General

- 9.2.1.1 The existing fire alarm system (Simplex 4002) shall be updated to cover the new addition/renovation. Renovated areas shall be zoned, that is, initiating devices in the bunk/bed rooms shall be connected as one loop, the equipment bay and maintenance shop as another loop, and the non-berthing area hallway, day/dining room as another loop. A remote annunciator shall be provided and be mounted in the alarm/watch room.
- 9.2.1.2 Audible alarm indication shall be via electronic horns. Spacing and location shall be commensurate with the applicable codes. Visual alarm indication shall be by synchronized strobes. Spacing and location shall be commensurate with the ADA (Americans with Disabilities Act) applicable codes.
- 9.2.1.3 The NAC (Notification Appliance Circuits) shall be Class "A", Style "Z". The SLC (Signal Line Circuits) shall be Class "A", Style "6". The AID (Alarm Indicating Device) circuits shall be Class "A", Style "D". All circuits shall have at least 40% spare capacity for additional devices (initiating and indicating). Wiring and conduit for the alarm initiating devices (pull stations, water flow, etc.) shall be completely segregated from the wiring and conduit for the alarm indicating devices (horns and strobes). Minimum conduit size shall be ½ inch.
- 9.2.1.4 Alarm points from the new sprinkler system shall be integrated into the existing fire alarm control panel.
- 9.2.1.5 Manual pull stations shall be provided at all exterior doors and egress points from the building. Smoke detectors shall be provided throughout this facility. Fire alarm horns and strobes shall be provided throughout the interior.
- 9.2.1.6 Manual pull stations, water flow switches, smoke detectors, heat detectors, and pressure switches shall be circuited to initiate general alarm.
- 9.2.1.7 Sprinkler tamper switches, high and low air switches shall be circuited to initiate a supervisory alarm.
- 9.2.1.8 Fire Alarm circuit faults such as open circuits, short circuits, and or a grounds shall initiate a trouble signal.

9.2.2 Alarm Initiating Devices

- 9.2.2.1 Manual pull stations shall be of the double-action type. They shall be reset with the use of a key. The key shall be put into the pull station from the front of the unit. The key shall not enter the pull station from the side, top or bottom.

- 9.2.2.2 Smoke detectors shall be self-restoring to normal condition after activation. The detector shall plug into a base unit. The base unit shall contain one or two red LEDs to indicate that the smoke detector is operational. The LED(s) shall blink to indicate that the detector is analyzing for the presence of smoke. The LED(s) shall stay lit to indicate that the unit is in alarm condition.
- 9.2.2.3 Duct smoke detectors shall be photoelectric. The sampling tube shall be perforated and shall traverse the full width of the affected duct. The duct detector shall be a complete unit consisting of housing, detector, and relay as required for fan shutdown and for signaling the FACP. If the duct detector is concealed above a finished ceiling, a remote LED plate shall be provided at the ceiling level to indicate the activity of the duct detector.
- 9.2.2.4 Heat detectors shall be fixed temperature or combination rate-of-rise and fixed temperature commensurate with the hazard to be protected. The detector shall plug into a base unit. The base unit shall contain one or two red LEDs to indicate that the heat detector is operational. The LED(s) shall blink to indicate that the detector is operating normally. The LED(s) shall stay lit to indicate that the unit is in the alarm condition.
- 9.2.2.5 Waterflow Switches shall be provided by the sprinkler contractor and shall be connected to the fire alarm system by a monitoring module.
- 9.2.2.6 Sprinkler valve supervisory switches shall be provided by the sprinkler contractor and shall be connected to the fire alarm system by a monitoring module.
- 9.2.3 Alarm Indicating Devices
 - 9.2.3.1 Fire alarm horns shall be of the vibrating and polarized type. They shall operate on 24 volts DC. The mechanisms shall be mounted behind a grille. The horns may be wall mounted or ceiling mounted.
 - 9.2.3.2 Visual signals shall be provided via strobe lights utilizing high-intensity clear plastic lens with a xenon flash tube. The word "FIRE" shall be engraved on the unit. The orientation of the word "FIRE" shall be correct. All strobes shall be UL 1971 compliant as well as ADA compliant. All strobes shall be synchronized to flash simultaneously. The strobes may be wall mounted or ceiling mounted.
 - 9.2.3.3 Combination horn/strobe units may be used at the discretion of the contractor.
- 9.2.4 Fire Alarm Control Panel (FACP)
 - 9.2.4.1 The existing fire alarm control panel shall be provided with the necessary equipment to integrate the new remote annunciator and the zones from the addition/renovation. Additional components shall be installed to provide additional spare capacity as required. New equipment shall be UL listed for its intended purpose, and be compatible with the existing system. Contractor shall coordinate fire alarm requirements with the base fire department.
 - 9.2.4.3 The display shall be alphanumeric and be capable of holding at least 80 characters on the liquid Quartz front. All operator control key

pad features shall be easily accessible at the front of the unit in the vicinity of the liquid quartz display.

- 9.2.4.4 The existing written instruction (step-by-step directions to assist the operator at hand in the correct operation of the fire alarm system) shall be revised to include the area covered by the new work.

9.2.5 Graphic Annunciator

Provide a graphic annunciator panel (in the watch/alarm room) with minimum dimensions 24 inches by 24 inches. The backbox shall be steel or aluminum. The faceplate shall be satin plastic. The faceplate shall contain, as a minimum, an architectural drawing of the facility. It shall show doors, and rooms. A "YOU ARE HERE" designation shall be shown and correctly oriented. LEDs shall identify the type of device initiating the condition (pull station, waterflow, etc.); and the type of problem (alarm, supervisory or trouble). Normal power and emergency power must also be shown on the face plate. Normal power light shall be green. Alarm power light shall be red. Supervisory and trouble lights shall be yellow. Device lights shall be red. Provide a lamp test switch on the face of the unit to test the graphic annunciator LEDs.

9.2.6 Emergency Power Supply

- 9.2.6.1 Battery capacity shall be re-calculated to include the new devices in the addition. Provide sealed lead-acid batteries with sufficient capacity to operate the complete fire alarm system in the supervisory mode for 72 hours. Following the supervisory mode, provide additional capacity to operate all devices in the "alarm" mode for a minimum of 15 minutes.
- 9.2.6.2 The batteries shall be housed in a separate lockable steel cabinet. The cabinet shall be intended for battery storage from the fire alarm equipment manufacturer. The batteries shall not sit directly on the metal floor of the battery cabinet. A wood bottom shall be provided in the cabinet for the batteries to rest upon.
- 9.2.6.3 Power for the fire alarm system shall be automatically transferred from the normal 120 volts AC to battery back up. Manual transfer shall not be permitted.

9.2.7 Wire

All wire shall be solid copper. Minimum wire size shall be #12 AWG for 120 volts AC circuits. Minimum wire size shall be #16 AWG for 24 volts DC circuits. Alarm initiating circuits shall utilize twisted-shielded pair wiring with a foil shield and a #16 AWG drain wire.

9.2.8 Installation

- 9.2.8.1 All wire shall be installed in conduit, $\frac{3}{4}$ inch minimum. All wiring and conduit shall be laid parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings. All wiring and conduit shall be installed concealed unless in an unfinished area.
- 9.2.8.2 Battery box to be installed adjacent to the fire alarm control panel.

9.3 FIRE SUPPRESSION SYSTEM

9.3.1 General:

The Fort Detrick Fire Station, including the renovated existing station and the new addition of the apparatus building, (refer to Chapter 5 for locations) shall be fully protected with automatic wet pipe sprinkler systems. All areas of the station shall be protected. Sprinkler system design shall be in accordance with MIL-HDBK-1008C, NFPA 13, and Specification Section 13930. In the event of a specification conflict, the most stringent shall apply. Design densities and design areas shall be as indicated in MIL-HDBK-1008C. The sprinkler system shall be designed using computer generated hydraulic calculations. As a minimum, the sprinkler system shall be configured into three zones: the second floor, the first floor of the existing station, and the new apparatus building. Each zone shall be provided with a zone valve assembly consisting of an OS&Y gate valve, tamper switch, flow switch, test and drain valve assembly and drain line. Test and drain lines shall be routed to the exterior of the building. Sprinkler components which require periodic access, such as floor control valves, drain valves and test valves shall not be located in inaccessible areas.

9.3.1.1 Sprinkler hazard classifications for specific areas shall be as indicated below. Classifications for areas not listed shall be in accordance with MIL-HDBK-1008C and NFPA 13.

9.3.1.2 Ordinary Hazard Group I - mechanical rooms without fuel fired equipment, electrical rooms, and communication rooms. Ordinary Hazard Group II - storage rooms, mechanical rooms with fuel fired equipment

9.3.1.3 Exterior hose stream demand shall be in accordance with MIL-HDBK 1008C. This shall be 250 gpm for light hazard and 500 gpm for ordinary hazard. Hose stream demand shall be included in the hydraulic calculations.

9.3.1.4 Fire hose standpipe systems shall be provided if required. Standpipe systems shall be designed in accordance with MIL-HDBK 1008C and NFPA 14.

9.3.2 Piping

No copper or plastic sprinkler piping shall be allowed. All sprinkler piping shall be black steel schedule 40.

9.3.3 Joints

All joints shall be grooved or threaded. Press fit joints shall not be permitted.

9.3.4 Fire Water Supply

9.3.4.1 Base utility map shows an existing 8 inch street water main on the south side of Porter Street about 30 feet from the building. The contractor shall tap a fire water supply line from this main. Piping installation shall be in accordance with requirements in Chapter 2, Civil Design and Site Development.

9.3.4.2 The contractor in the immediate vicinity of the site plan shall conduct a fire hydrant flow test. The contractor shall utilize their flow test data as the basis for the water supply design.

9.3.5 Incoming Service

The incoming fire protection service shall be located in the storage room adjacent to the workroom and apparatus building. A double check backflow

preventer shall be provided with OS&Y valves at each end to isolate the assembly.

9.3.6 Sprinkler Heads

Sprinklers with internal O-rings shall not be used. Sprinklers shall be quick response unless otherwise indicated. Head placement shall be in the middle of ceiling tiles in finished areas.

9.3.7 Fire Department Connection

A fire department wall type Siamese connection shall be provided. The connection shall be chrome plated brass, with a wall escutcheon and two-way connections. Two 2-1/2 inch female inlets shall be provided, having NH standard threads. Each inlet shall have a clapper valve, a plug and a chain. The escutcheon shall be lettered to identify the interior building fire protection system(s) as appropriate, either "AUTO SPKR" or "AUTO SPKR & STANDPIPE".

9.3.8 Alarm & Supervisory Devices

9.3.8.1 Water flow switches shall be vane type and be designed for horizontal or vertical installation. They shall have 2-SPDT circuit switches to provide isolated alarm and auxiliary contacts. The switch shall be capable of field adjustable retard from 0 to 60 seconds. The switches shall be initially set to 30-second retard. Each switch shall be equipped with a tamper-proof cover that sends a signal to the fire alarm control panel when the cover is removed.

9.3.8.2 Valve tamper switch shall be suitable for mounting to the type of control valve to be supervised. The switch shall be tamper resistant and contain one set of SPDT (Form C) contacts. The switch shall send a supervisory signal to the fire alarm control panel upon closure of the valve of more than two revolutions of the valve stem.

9.3.8.3 The exterior PIV (post indicator valve) shall be electrically supervised by the fire alarm system. The PIV valve shall be a separate fire alarm supervisory point. The PIV shall be electrically supervised regardless of whether the valve is monitoring a combination domestic/fire protection feed to the building or a fire protection (only) feed into the building.

9.4 Testing

9.4.1 Testing Standards:

Upon completion of the installation, the system shall be subjected to functional, operational, performance and acceptance tests of each installed initiating and notification appliance. The test shall include all requirements of NFPA 72 and the following:

- a. Test of each function of the control panel.
- b. Test of each circuit in both trouble and normal modes.
- c. Tests of each alarm initiating devices in both normal and trouble conditions.
- d. Tests of each control circuit and device.
- e. Tests of each alarm notification appliance.
- f. Tests of the battery charger and batteries.
- g. Complete operational tests under emergency power supply.
- h. Visual inspection of wiring connections.

- i. Opening the circuit at each alarm initiating device and notification appliance to test the wiring supervisory feature.
- j. Ground faults.
- k. Short circuit faults.
- l. Stray voltage.
- m. Loop resistance.

Provide minimum 10 days advance notice of final acceptance test request. Provide two sets of "AS-BUILT" drawings for the final acceptance test. Provide all necessary two-way communication devices (hand-held radios) in the quantity deemed necessary by the government. Provide all other test equipment as directed by the government. The contractor shall coordinate installation and testing with the POC Debbie Faux (301) 677-1774.

CHAPTER 10

ELECTRICAL

10.0 ELECTRICAL

10.1 GENERAL REQUIREMENTS

10.1.1 Design Standards

Design and installation of electrical, and other systems listed herein, for the facility shall comply with the applicable requirements of the following latest standards listed in the reference standards paragraphs of this proposal:

- a. DoD Form 1391, Military Construction Project Data
- b. DoD 4270.1 M, Construction Criteria Manual
- c. DoD 6055.6, Department of Defense Fire Protection Program
- d. MIL-HDBK-1008C, Fire Protection for Facilities Engineering, Design, and Construction
- e. AR 190-13, Army Physical Security Manual
- f. NFPA, National Fire Protection Association
- g. NFPA 70, National Electrical Code
- h. NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces
- i. NFPA 72, Standard for Fire Protection Signaling Systems
- j. NFPA 72E, Standard for Automatic Fire Detectors
- k. NFPA 101, Code for Safety to Life from Fire in Building and Structures
- l. TM 5-811-1, Electrical Power Supply and Distribution
- m. TM 5-811-2, Electrical Design, Interior Electrical Systems
- n. TI 800-01, Design Criteria
- o. TI 811-16, Lighting Design
- p. Illuminating Engineering Society Application and Reference Handbooks (IES Handbook)
- q. Institute of Electrical and Electronics Engineers Standards (IEEE)
- r. National Electrical Manufacturer's Association Standards (NEMA)
- s. American Society for Testing and Materials (ASTM)
- t. Underwriters' Laboratories Inc. Standards (UL)

- u. American National Standards Institute (ANSI)
- v. Americans with Disabilities Act (ADA)
- w. Telecommunication and Electronic Industries Association Standards
- x. TIA/EIA 568-A, Cabling Standard
- y. TIA/EIA 569, Telecommunications Pathways and Spaces
- z. TIA/EIA 606, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
- aa. Insulated Cable Engineers Association Standards
- bb. ICEA S-80-576, Communications Wire and Cable for Premises Wiring
- cc. I3A - Design and Implementation Guide

10.1.2 PCB Standards

All new electrical equipment shall be supplied with no detectable PCB's. New fluorescent lighting fixture ballasts shall be clearly marked "NO PCB". Certified PCB tests from an independent laboratory with the serial number of test results on the unit, shall be obtained by the Contractor.

10.1.3 Seismic Protection

The electrical equipment and systems listed below shall be seismically protected:

- Control Panels
- Air Handling Units
- Pumps with Motors
- Lighting Fixtures

10.1.4 Demolition/Relocation/New Work

Feeders to existing electrical systems at the area(s) to be renovated, shall be removed up to the source panel. Panels 'LB' shall be relocated to the new partition immediated to the existing to be demolished. Existing equipment (hose dryer, clothes washer/dryer, compressor, galley equipment, etc) scheduled to be re-used shall be disconnected from its present location, be relocated and provided with power at new location. New work will be conducted in phases to minimize disruption of the fire department operations. Contractor shall coordinate work with other trades for work phasing, and the new location of equipment with Contracting Officer.

10.1.5 Temporary Power

Contractor shall provide Fire Department temporary trailers with power from the existing building distribution system in the electrical room.

10.1.6 Corrosion Control

Provide cathodic protection for any buried/submerged metallic utility system (piping or tanks). A soil resistivity test shall be conducted. The cathodic protection survey and design must be performed by a National Association of

Corrosion Engineers (NACE) Accredited Corrosion Specialist, NACE Certified Cathodic Protection Specialist, or a Registered Professional Corrosion Engineer. This accreditation and/or registration must have been obtained in the field of cathodic protection. Cathodic protection system shall be in accordance with NACE RP-01-69, NACE RP-01, TM 5-811-7, and ETL 1110-3-474. Design anodes for a 20 year life minimum.

10.2 POWER AND LIGHTING REQUIREMENTS

10.2.1 Electrical Service

This project will be the third expansion of the facility since the original construction completion in 1987. Per PW, the existing 150 KVA electrical service is adequate to support the new load from the alteration/addition.

10.2.2 Secondary Distribution

Secondary distribution equipment provided shall be connected to the existing electrical distribution system in the electrical room.

10.2.3 Equipment Interrupting Capacity

Electrical equipment provided shall match the short circuit rating of the existing electrical distribution system.

10.2.4 Interior Power Distribution

Electrical panelboards shall be of the distribution type. Voltage drop shall be limited to 3% for branch circuits and 1% for feeders. Overall allowable voltage drop shall not be greater than 5% (assuming existing 2% for the existing service entrance conductors).

10.2.4.1 Motors

Motors greater than $\frac{3}{4}$ -horsepower (HP) shall be provided in 3-phase configuration with phase failure relay protection. Power factor correction capacitor(s) shall be provided for motors larger than 3HP. Motors efficiencies shall be as specified in the table "MINIMUM NOMINAL EFFICIENCIES" below.

MINIMUM NOMINAL MOTOR EFFICIENCIES OPEN DRIP PROOF MOTORS

<u>HP</u>	<u>1200 RPM</u>	<u>1800 RPM</u>	<u>3600 RPM</u>
1	82.5	85.5	80.0
1.5	86.5	86.5	85.5
2	87.5	86.5	86.5
3	89.5	89.5	86.5
5	89.5	89.5	89.5
7.5	91.5	91.0	89.5
10	91.7	91.7	90.2
15	92.4	93.0	91.0
20	92.4	93.0	92.4
25	93.0	93.6	93.0
30	93.6	93.6	93.0
40	94.1	94.1	93.6
50	94.1	94.5	93.6

10.2.4.2 Cables and Wires

No. 8 AWG and larger diameter conductors shall be stranded. Conductors No. 10 AWG and smaller diameter shall be solid, except that conductors for remote control, alarm, and signal circuits, classes 1 (No. 14 AWG, Nom), 2 (No. 16 AWG, Nom), and 3 (No. 22 AWG, Nom), shall be stranded. All conductors shall be copper.

10.2.4.3 Conduits and Tubing System

10.2.4.3.1 Minimum size of raceways shall be $\frac{3}{4}$ " for power, and $\frac{1}{2}$ " for low energy, control and signal circuits. Electrical metallic tubing (EMT) may be installed only within buildings. EMT may be installed in concrete and grout in dry locations. EMT installed in concrete or grout shall be provided with concrete tight fittings. EMT shall not be installed in damp or wet locations, or the air space of exterior masonry cavity walls. Aluminum conduit may be used only where installed exposed in dry locations. Penetrations of above grade floor slabs, time-rated partitions and fire walls shall be firestopped. Intermediate metal conduit (IMC) may be used as an option for rigid steel conduit. Raceways shall be kept 6 inches away from parallel runs of flues, steam pipes and hot-water pipes.

10.2.4.3.2 Raceways shall be concealed within finished walls, ceilings, and floors. Raceways crossing structural expansion joints or seismic joints shall be provided with suitable expansion fittings or other suitable means to compensate for the building expansion and contraction and to provide for continuity of grounding. Conduit installed in slabs-on-grade shall be rigid steel or IMC. Changes in direction of runs shall be made with symmetrical bends or cast-metal fittings. Metallic conduits and tubing, and the support system to which they are attached, shall be securely and rigidly fastened in place to prevent vertical and horizontal movement. Exposed raceways shall be installed parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceilings.

10.2.4.4 Circuit Breakers

10.2.4.4.1 Circuit breakers shall be installed in panelboards, switchboards, enclosures, or combination motor controllers. Circuit breakers shall be fully rated type.

10.2.4.4.2 Circuit breakers rated 15 amperes and intended to switch 120 volts or less fluorescent lighting loads shall be marked "SWD."

10.2.4.4.3 Circuit breakers 60 amperes or below, 208 volts, 1-pole or 2-pole, intended to protect multi-motor and combination-load installations involved in heating, air conditioning, and refrigerating equipment shall be marked "Listed HACR Type."

10.2.4.5 Receptacles

10.2.4.5.1 Each circuit shall be provided with an isolated ground and dedicated neutral conductor. Convenience receptacles in administrative and maintenance shop areas shall be provided at 10 feet on centers along perimeter walls and within 5 feet from doors. Outlets along perimeter wall of corridors, lobby, and circulation areas for use of janitorial or other equipment, shall be installed at 30 feet (max) on centers. Where counters are provided in rooms, receptacles shall be provided above the counter top back splash at 18 inches from counter-ends. In kitchen counter tops and island-type (or peninsula type) counter tops, the minimum number of receptacles and small

appliance branch circuits as required by NFPA 70 Article 210-52(b)(2) and (c), shall be provided, except that the countertop small appliance circuits shall not be limited to two and the circuits shall be dedicated to just the kitchen area. At least one receptacle shall be provided in storage rooms, janitor closets, and bathrooms. In bathrooms, one additional receptacle shall be provided above the countertop back splash and adjacent to each basin area. Bathroom receptacle outlets shall be supplied by at least one 20-ampere branch circuit.

10.2.4.5.2 Ground-fault circuit-interrupter (GFCI) receptacles shall be provided where receptacles are located within 6 feet of sinks such as in the toilets, janitor's closets and other wet areas. Weatherproof GFCI wall mounted receptacle outlets shall be provided inside and outside the equipment bays.

10.2.4.5.3 Maximum of six convenience receptacles shall be circuited to a 20-ampere branch circuit. Each administrative area workstation shall be circuited to a 20-ampere branch circuit. In accordance with UBC 4304, outlets in the same stud space and on opposite sides of fire rated walls or partitions must be separated by a minimum of 2 feet horizontal distance. Device face plates inside the building shall be nylon impact resistant type and ivory colored.

10.2.4.6 Galley Electrical Equipment

Power to cooking equipment (stove/range, oven, solenoid to natural gas supply, fryer, heat lamps, etc) except refrigeration shall be connected to a panelboard protected by a contactor and emergency-power-out (epo) mushroom switch at the galley exit. In the event of an emergency, when activated, the epo switch shall disable the power to the panelboard serving the galley equipment.

10.2.4.7 Equipment Bay

10.2.4.7.1 Power: 120V receptacle outlets on retractable drop cords attached to the roof trusses, shall be provided in-between bays to power electrical systems on-board fire-fighting vehicles. Haz-Mat equipment bay shall be provided with a weatherproof 30A twist-lock dedicated receptacle outlet mounted on the north wall of the equipment bay. Convenience receptacle outlets shall be provided at front and rear columns.

10.2.4.7.2 Roll-Up Doors: Provide front roll-up doors with electric opener with local, remote/override, and radio operators. Local (raise-off-lower) control switch shall be mounted on the wall facing the driver of the vehicle exiting the bay. Controller/starter shall be provided with door position indicating signal light mentioned below. Remote radio operator shall be provided for each roll-up door and shall be unique (in operating frequency) from other operators. A remote mounted red-mushroom override switch in the alarm/watch room, shall operate (open only) all the front roll-up door at the same time in the event of an emergency regardless of the position of the doors. Front roll-up doors shall be circuited to a source supported by the emergency generator. Provide rear roll-up door with local (raise-off-lower) control switch with red/green indicator light to operate as indicated above.

10.2.5 Lighting

10.2.5.1 Interior Lighting

Lighting intensity levels shall be provided in accordance with MIL-HDBK 1190 and IES Lighting Handbook as shown on the table below. The majority of rooms

shall be provided with 2L or 3L recessed fluorescent fixtures equipped with energy saving 4 foot, 32-watt T8 lamps and energy efficient electronic ballasts. Parabolic fluorescent fixtures shall be provided for hallways, administrative offices, dining and lounge areas. General occupancy areas like bedrooms, bunk rooms and toilets shall be provided with prismatic troffers, and mechanical/electrical room or similar spaces shall be provided with industrial grade fluorescent luminaires. Open type fluorescent luminaires shall be provided with tube and wire guards. Toilets shall be provided with wet/damp listed lighting luminaires. Each area lighting system shall be switched locally and as indicated below. Multi egressed/accessed areas will be provided with three-way/four-way switching accordingly. Devices will mounted in accordance with the ADA applicable standards. Design footcandle levels and other lighting requirements shall be provided according to Table 3-6 in AFP 88-38 as shown below:

<u>Area</u>	<u>Footcandle Level</u>	<u>Multiple Switching</u>	<u>Dimming Capability</u>
Corridors	10	Yes (i)	No
Dining/Day Room*	25	Yes	Yes
Admin/Offices	50	No	No
Bunk/Bed Rooms**	50	No (i)	No
Toilets	20	No	No
Storage/Closets	5	No	No
Equipment Bay***	20	Yes (i)	No
Maint/Work Room	30	Yes	No
Mech/Elec	15	Yes	No
Outdoors	0.5	No (ii)	No

- * Dining/Day room lighting system shall include compact fluorescent lighting luminaires controlled by dimming switches. Recessed 2'X4' overhead parabolic luminaires shall be controlled by the a local switch.
- ** Bed/Bunk room lighting system includes wall mounted 4'-2L over-bed luminaire with pull chain switch. Recessed 2'X4' 2L overhead prismatic luminaires shall be controlled by the local switch and the programmable low-voltage lighting control system mentioned below
- *** Truss mounted equipment bay industrial fluorescent luminaires shall be circuited for 2-level switching (every-other fixture), controlled by switches at each egresses to the bay, in the watch/alarm room, and by the programmable low-voltage lighting control system mentioned below.
- i Lighting system shall be controlled by the local switch(es) serving the area, the programmable low-voltage lighting controls system (activated by a red-mushroom momentary switch), and the existing tone alert system (Motorola) in the watch/alarm room. In the event of an emergency, the activation of the switch and/or the tone alert system shall turn-on the overhead lighting fixtures regardless of the setting of the local switch(es). Power to the lighting systems controlled by the programmable low-voltage lighting control system shall be circuited to a panelboard supported by the emergency generator.
- ii Provide each building mounted outdoor luminaires with photocell.

10.2.5.2 Signal Lights

Roll-Up Doors: Each equipment bay roll-up door shall be provided with a red/green position indicator lights mounted on the wall facing the driver of the vehicle exiting the bay. Red/Upper light shall indicate other than 'not-fully-open' roll-up door position, and the green/lower light only when the roll-up door is fully open. Lighting shall be integrated with the roll-up door controller/starter. Provide upper and lower limit switches accordingly.

Beacon: Inside, front and rear of equipment bay, and the north parking area of the fire house shall be provided with red rotating 0-5 minute(s) timed beacon lights controlled by an emergency mushroom switch in the alarm/watch room. Flashing lights shall also be provided on top of the fire emergency signal signs along Porter Street. System shall be circuited to a panelboard source supported by the emergency generator and, be incorporated into the low-voltage lighting control system mentioned above. See Contracting Officer for the time setting of switch.

10.2.5.3 Exterior Lighting

Building mounted, perimeter and parking area lighting shall be provided with High Pressure Sodium (HPS) fixtures. Parking lot luminaires shall be mounted on 30' aluminum poles cast-in-place, reinforced concrete foundation. Lighting fixtures and poles shall match existing equipment. Pole exterior lighting fixtures shall be controlled by existing combination photocell/timer in the electrical room.

10.2.5.4 Exit Lights

Illuminated (Red LED type) exit lighting fixtures shall be provided with self contained emergency backup units. Night lighting shall be provided in the watch/alarm room and hallways. Illuminated exit signs and night lights shall be connected to a source panel supported by the existing emergency generator.

10.2.6 Emergency Lighting

Emergency lighting in areas not supported by the emergency generators shall be 12-volt emergency lighting battery units with 2-sealed beam lamps.

10.2.7 Emergency Power

Equipment/System requiring continuous power shall be connected to the existing emergency standby generator (Kato Light - 37KW 208Y/120V 3P 4W). Existing Police/Fire Department loads connected to the generator shall be audited. Non-essential load(s) shall be shed, and reconnected to a non-emergency generator supported source. Coordinate police office generator loads with the Provost. Fire department generator loads shall be as indicated on this document.

10.3 DATA/COMMUNICATIONS

10.3.1 Scope

Contractor shall provide premises distribution system consisting of vertical/horizontal telephone and data (including LAN) signal runs from the end-user terminals to the existing tie-in point in the existing electrical room. Government will conduct final connection to the existing system in the electrical room. Cables shall be compatible with the existing system.

10.3.2 Building Communication Requirements

10.3.2.1 Materials and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products and shall be the manufacturer's latest standard design that has been in satisfactory use for at least 1 year prior to installation. Materials and equipment shall conform to respective publications of Telecommunications Industry Association/Electronic Industries Association TIA/EIA 568-A, TIA/EIA 569, TIA/EIA 607, EIA TSB 67, Insulated Cable Engineers Association ICEA S-80-576,

and ICEA S-83-596, and other requirements specified below and to the applicable requirements of NFPA 70.

10.3.2.2 Coordinate with the local Director of Information Management (DOIM) or equivalent personnel to determine existing telecommunication capability and whether or not the existing facilities will need to be upgraded to support any new telecommunications equipment and distribution systems associated with this project. Involve the DOIM during the design process. Contractor shall coordinate communication requirements with Mr. John Bennett, telephone number(s) (310) 619-3287 or (301) 619-3205 of DOIM/Bldg 810.

10.3.3 Installer Qualifications

Installer shall have a minimum of three years experience in the application, installation, and testing of communications system and equipment, including the installation of copper and fiber optic cable and components.

10.3.4 Inside Plant

Telephone and Local Area Network (LAN) systems shall be pre-wired in accordance with ETL 1110-3-502 to include two 8-pin RJ-45 voice/data jacks. One RJ-45 jack shall be for voice (upper) and the other RJ-45 jack will be for data (lower). Wiring to each RJ45 jacks shall consist of Category 6 UTP cables. Recessed wall-mounted outlets shall be wired by running plenum rated UTP cables through the overhead cable tray system and then in concealed conduits from the cable trays over to and down to the outlets. Voice cables shall be terminated on the existing 110 connector blocks mounted on TTB plywood backboards, and the data cable on the data patch panels in the electrical room.

10.3.5 Quantities

Number of data/comm outlets shall be in accordance with the table shown below.

<u>Area Description</u>	<u>No. of jacks</u>
Offices	2 (Each)
Chief/Asst. Chief Offices	4 (Each)
Bunk/Dorm Rooms	1 (Each)
Dining/Day Room	4 (Each)
Alarm/Watch Room	6 (Each)
Kitchen	1 (Voice Only)
Work Room/Area	1 (Each)
Equipment Bay	2 (Voice Only)

10.4 INTRUSION DETECTION SYSTEM

The existing PELCO intrusion detection system (IDS) located in the provost offices side of the facility shall be extended to cover the renovated areas. New equipment shall be compatible with the existing system. Cameras shall be provided to monitor exterior doors including the front and rear of the equipment bay. System power, alarm, and signal cable runs shall be installed in raceways. Existing IDS system shall be provided with the necessary equipment to integrate the new equipment from the addition/renovation. Contractor shall coordinated IDS requirements with the base provost offices.

10.5 INTERIOR CABLE TELEVISION

Contractor shall provide cable system premises distribution system (coaxial cable and connecting hardware) to transport television signals throughout the

building from the existing CATV patch panel in the electrical room to the end user locations. Watch/alarm room, dining/day room, bunk and bed rooms, and other designated areas shall be provided with female connector to accept the connecting coaxial cable from the user's television set. The above ceiling cable tray designated for low energy cable runs (voice and data) shall be used for the routing of coaxial cable to the end user terminals. The Contractor shall coordinate CATV requirements with the local provider (Adelphia) and the Contracting Officer.

10.6 PUBLIC ADDRESS (PA) SYSTEM

A new PA system shall be provided for the Fire Department side of the facility. Head-end equipment shall be mounted in the watch/alarm room, and shall include an amplifier, tuner, CD/cassette player and microphone. All bed/bunk rooms and offices shall be provided with speaker and wall mounted volume control. Hallways, day/dining room, toilets, inside/front/rear of equipment bay and the parking area north of the offices shall be provided with speakers. System shall be powered from a source supported by the emergency standby generator.

10.7 CABLE TRAY

Above ceiling 10" wide aluminum ladder type cable tray (suspended from the trusses) shall be provided for horizontal cable runs of power limited systems (data/comm, CATV, PA, etc) except fire alarm and IDS system. Each cable tray section shall be provided with a grounding strap to be connected to the next tray section. Section closest to the TTB shall be connected to the grounding system.

10.8 GROUNDING

An insulated green grounding conductor shall be installed to each receptacle. Grounding shall be provided as specified NFPA 70 for grounding panels, transformers and systems.

10.9 FIRE ALARM SYSTEM

The existing fire alarm system (Simplex 4002) shall be updated to cover the new addition/renovation. Renovated areas shall be zoned, that is, initiating devices in the bunk/bed rooms shall be connected as one loop, the equipment bay and maintenance shop as another loop, and the non-berthing area hallway, day/dining room as another loop. A remote annunciator shall be provided and be mounted in the alarm/watch room. The existing fire alarm control panel shall be provided with the necessary equipment to integrate the new remote annunciator and the zones from the addition/renovation. Contractor shall coordinate fire alarm requirements with the base fire department.

10.10 PARKING LOT ACCESS

A new parking lot access system shall be provided to access the east and west ends of the parking area north of the building. System shall include electric barriers with sensors and proximity transponder(s). Sensor shall detect and automatically open the gate due the presence of a transponder from an incoming vehicle and distinguish other transponders from transient traffic along Porter Street.

Fort Detrick, Maryland

Installation Design Guidelines



Executive Summary

Final
May 1991

Contract Number DACA 31-89-C-0111

CONTENTS

INTRODUCTION.....	1
PURPOSE.....	1
ORGANIZATION.....	2
HOW TO USE.....	2
Section 1: BACKGROUND	3
History of Development	3
Image of Fort Detrick	6
Inventory and Analysis of Existing Conditions	7
Section 2: VISUAL ZONES-	12

Section 3: DESIGN GUIDELINES.....	15
Boundaries-	15
Entries	15
Architecture.....	15
Roads.....	17
Parking	17
Pedestrian Circulation	18
Plazas and Courtyards.....	19
Plant Materials	20
Signage.....	20
Lighting.....	21
Site Furnishings	22
Security and Utilities	23
CONCLUSIONS	23

TABLE OF CONTENTS

FIGURES

Figure 1	
Regional Location	3
Figure 2	
Vicinity Location	4
Figure 3	
Fort Detrick Boundariew	7
Figure 4	
Fort Detrick Entries	8
Figure 5	
Visual Zones	13
Figure 6	
Federal Style Building Prevalent in Frederick	15
Figure 7	
Masonry Laboratory Building Prototype	16

Figure 8	
Large Operations Building Prototype	16
Figure 9	
Separation of Parking Lot and Road	18
Figure 10	
Building Entrances	19
Figure 11	
Social Spaces	19
Figure 12	
Family Spaces	19
Figure 13	
Standard Shoe Box Light Fixture	21
Figure 14	
Wrought Iron Fence for Military Road Boundary	22

Fort Detrick, Maryland

Installation Design Guidelines



Executive Summary

Final
May 1991

Contract Number DACA 31-89-C-0111

CONTENTS

INTRODUCTION.....	1
PURPOSE.....	1
ORGANIZATION.....	2
HOW TO USE.....	2
Section 1: BACKGROUND	3
History of Development	3
Image of Fort Detrick	6
Inventory and Analysis of Existing Conditions	7
Section 2: VISUAL ZONES-	12

Section 3: DESIGN GUIDELINES.....	15
Boundaries-	15
Entries	15
Architecture.....	15
Roads.....	17
Parking	17
Pedestrian Circulation	18
Plazas and Courtyards.....	19
Plant Materials	20
Signage.....	20
Lighting.....	21
Site Furnishings	22
Security and Utilities	23
CONCLUSIONS	23

TABLE OF CONTENTS

FIGURES

Figure 1	
Regional Location	3
Figure 2	
Vicinity Location	4
Figure 3	
Fort Detrick Boundariew	7
Figure 4	
Fort Detrick Entries	8
Figure 5	
Visual Zones	13
Figure 6	
Federal Style Building Prevalent in Frederick	15
Figure 7	
Masonry Laboratory Building Prototype	16

Figure 8	
Large Operations Building Prototype	16
Figure 9	
Separation of Parking Lot and Road	18
Figure 10	
Building Entrances	19
Figure 11	
Social Spaces	19
Figure 12	
Family Spaces	19
Figure 13	
Standard Shoe Box Light Fixture	21
Figure 14	
Wrought Iron Fence for Military Road Boundary	22

IGNAGE

General Principles

There are several principles that should be followed in the design and location of all signage on the post.

- When possible, consolidate signs into a unified system to avoid landscape clutter.
- Combine signs with lighting fixtures to reduce unnecessary posts and to enhance overall illumination.
- Information signs should be placed at natural gathering points and should be included in the design of site furnishings, such as kiosks.
- Avoid placement of signs where they may conflict with pedestrian traffic.
- Sign location should avoid conflict with door openings or vehicular operation.
- Sign location should not be obstructed by parked vehicles, site furnishings, or other objects.
- Signs should be placed to allow safe pedestrian clearance, vertically and laterally.
- Information contained on a sign should be as concise and direct as possible.
- Lettering and graphic symbols should be bold and simple.
- Contrasting color schemes (light images on dark backgrounds) make signs easier to read.

General Specifications

All signs, unless otherwise noted, can be used in all zones.

Sign panels are removable, so that information on the sign may be easily changed.

Specifications for the various types of signage is as follows:

Construction: .125" extruded aluminum, painted with a quality, one-component, acrylic lacquer used in conjunction with a quality wash primer.

Color: Panel (background) to match *Spraylat* 20-313 Duranodic. Lettering to match *Spraylat* 20-01 White Gloss.

Message: All lettering will be Helvetica Medium.

Footing: See Figure 3-62 for standard footing detail.

Specialty Signage

Any special types of signage, such as memorials, or changes in signage specified in this section must be approved with the DEH Planning Department.

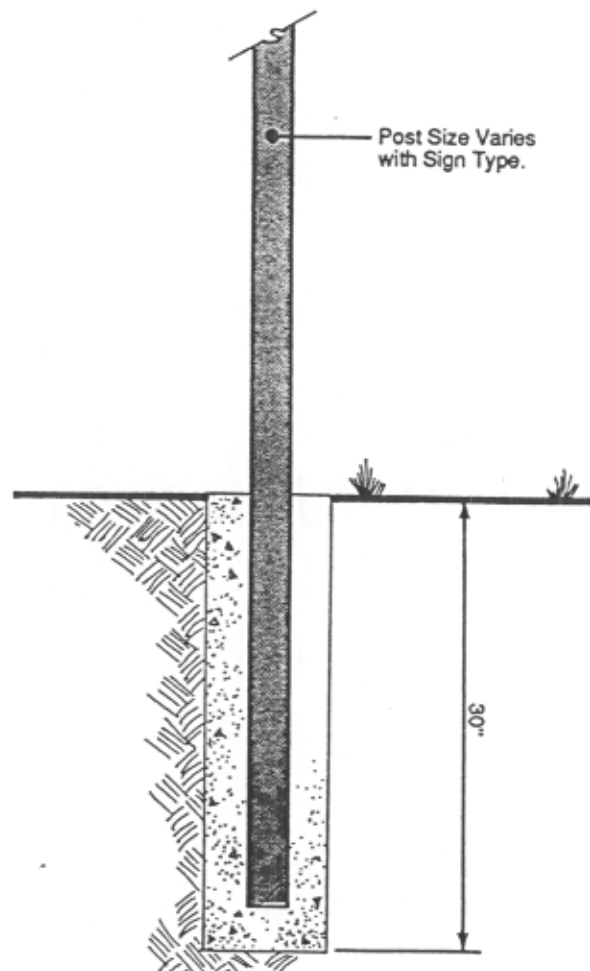


Figure 3-62: Standard Footing for Signage

DESIGN GUIDELINES

Signage

Main Entry Sign

The main entry sign introduces Fort Detrick to the public. Its design and maintenance creates a first impression that sets the tone for the visitor's reaction to the post. The main entry sign is part of the larger entry gate design, as illustrated in Figure 3-63.

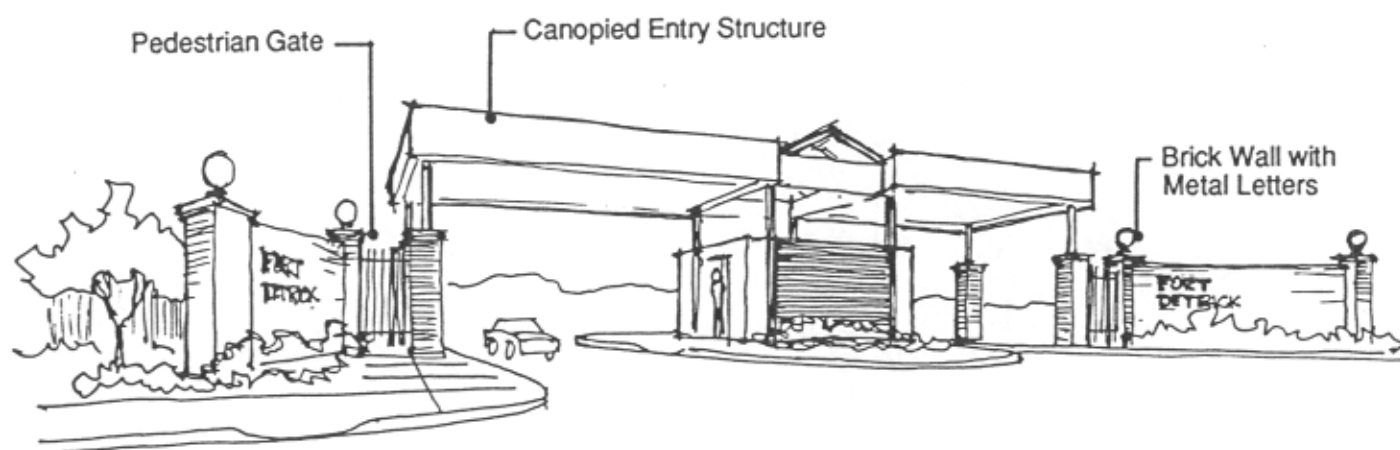


Figure 3-63: Main Entry Sign

Secondary Entry Sign

The secondary entry signs also introduce Fort Detrick to the public. Their design and maintenance reflects on the image of the post (see Figure 3-64).

Dimensions: 5'-0" overall; sign panel 3'-0" x 3'-0"; restrictions panel 1'-0" x 3'-0"; with a 2' clearance from the bottom of the panel to the ground.

Color: Panel (background) to match *Spraylat* 20-313 Duranodic. Lettering to match *Spraylat* 20-01 White Gloss.

Message: Upper- and lower-case Helvetica Medium.

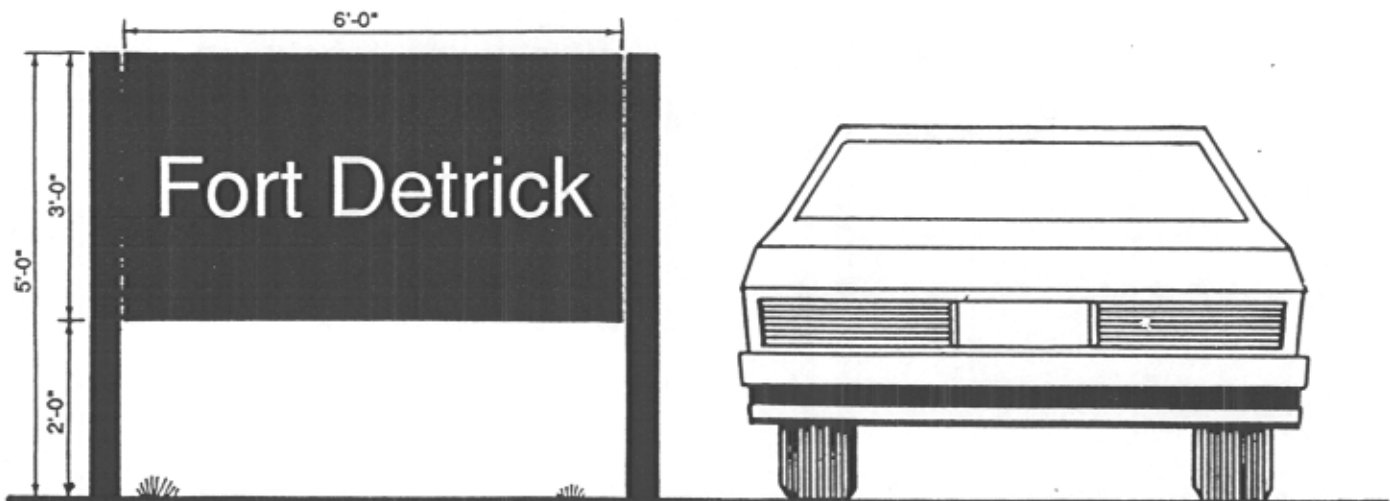


Figure 3-64: Secondary Entry Sign

DESIGN GUIDELINES

Signage

Site Orientation Sign

First-time visitors may obtain information and directions from the gatehouses located at the entries. However, a site identification sign is appropriate at the main gate and at other major points on post. Site orientation signs will consist of a base map and index of buildings so that this can be easily read by motorists. For the most effective directional system, it is recommended that building names be consistent on site orientation, directional, and building identification signs.

A simple reduction of the base site plan may work in creating the graphic for the base map; however, the site plan may have to be simplified to emphasize main circulation routes and destination points. The most common destinations should be listed in a map legend keyed to building numbers.

Because of the complexity of the site orientation signs, special pullover areas for motor vehicles may be necessary to allow newcomers a chance to adequately and safely view the map (see Figure 3-65).

General Layout: All lettering will be standard Helvetica Medium. The layout shown reflects proper alignment of all components; however, exact wording and map design must be approved prior to fabrication. It is suggested that a stylized map be developed for clarity.

Color: Sign background and posts will be the standard color. All lettering in the legend area will be white. Numerals indicating locations will be color coded to match corresponding map colors. The map graphic will be white background with black outlines of buildings and roadways.

Dimensions: All posts and framing for signs will be constructed of .125"-thick aluminum extrusions. Supporting posts will be 2" x 6" x 7'-6", and framing will be 9"-wide extrusions cut to support two 3'-0" x 8'-0" x .125" aluminum panels. A distance of 24" will be required from ground level to the bottom of the sign.

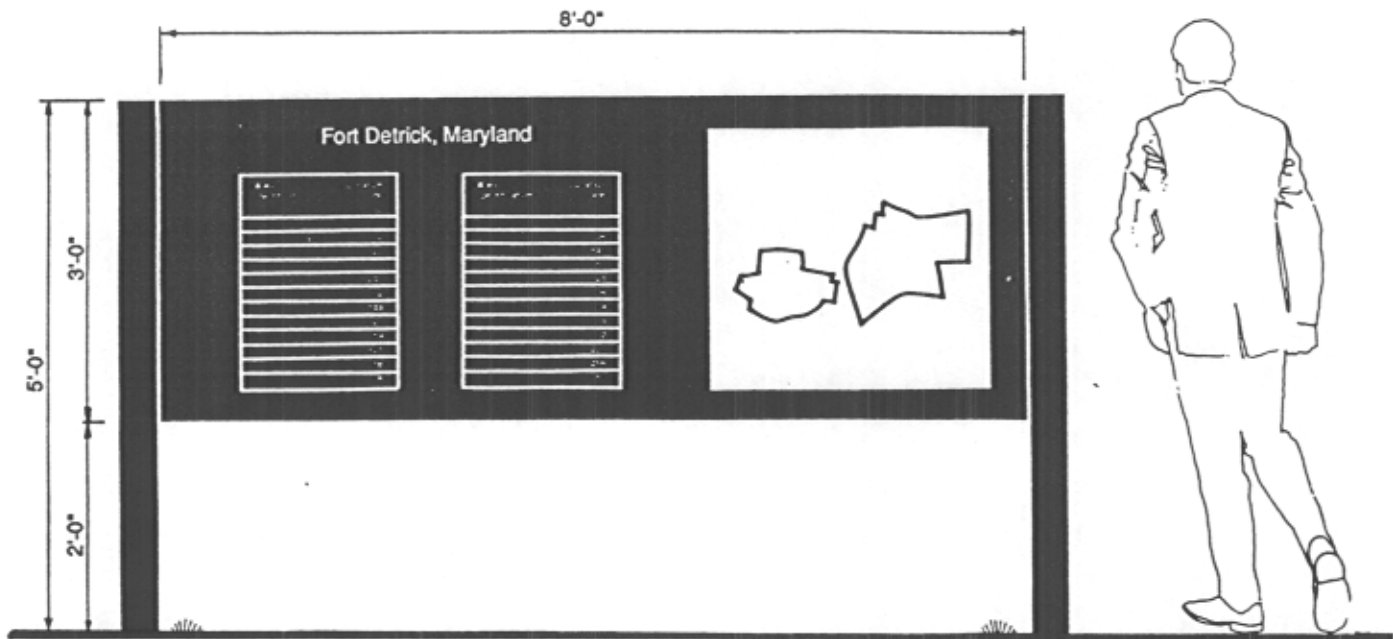


Figure 3-65: Site Orientation Sign

Vehicular Directional Sign

Effective directional signs can help to make the road system easier to use and can help to avoid confusion and frustration. Used in conjunction with adequate street identification and site orientation signs, they form the key to visitor orientation. The major function of vehicular directional signs will be to direct motorists to several key points on post (see Figure 3-66).

Dimensions: All posts and framing for vehicular directional signs will be standardized for uniformity. All posts will be 1-3/4" x .125" extruded aluminum. The maximum total post length for directional signs will be 9'-5", considering 36" below grade, 30" between grade and bottom of sign, and 48" maximum for sign. It is recommended that a standard height of 6'-6" from ground level to the top of the sign be used for all directional signs.

Sign panel units will be easily interchangeable and all units will be installed flush to appear as one unit. Sign faces will be constructed of .125" aluminum extrusions, not to exceed 10'-0" length.

Message: Upper- and lower-case Helvetica Medium, 3" capital-letter height, flush left or right to arrow.

Color: Panel (background) to match *Spraylat* 20-313 Duranodic. Lettering to match *Spraylat* 20-01 white Gloss.

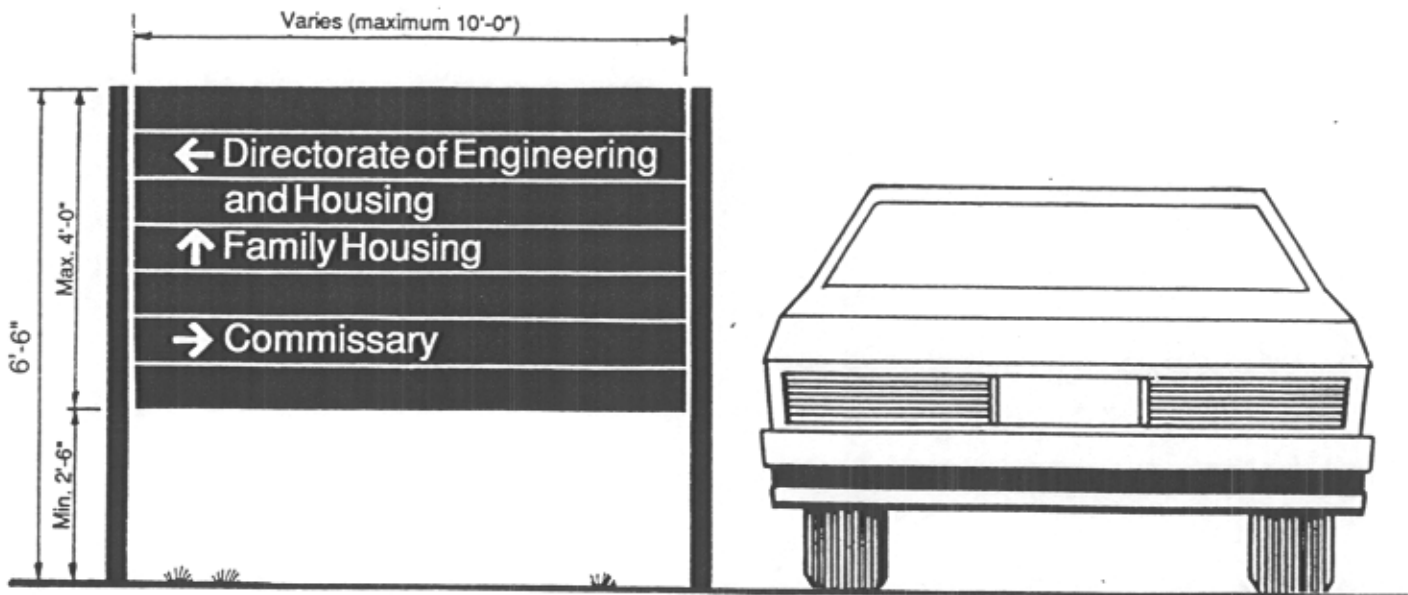


Figure 3-66: Vehicular Directional Sign

DESIGN GUIDELINES

Signage

Pedestrian Directional Sign

This type of sign provides directional guidance where pedestrian and vehicular circulation may be separated and where additional guidance is required. A separate sign slat is used for each destination. Graphics should generally appear on both sides of the sign to permit viewing by persons moving in either direction. Two sign heights are generally used: 6'-0" posts for signs with four to six destinations; 5'-0" posts for signs with two to three destinations (see Figure 3-67).

Dimensions: Slats: 6" high x 3'-0" wide.

Color: Panel (background) to match *Spraylat* 20-313 Duranodic. Lettering to match *Spraylat* 20-01 White Gloss.

Message: Text: Upper- and lower-case Helvetica medium, 2" capital-letter height, flush left or right to arrow. Arrow: standard tile, 3" high, placed left or right as appropriate.

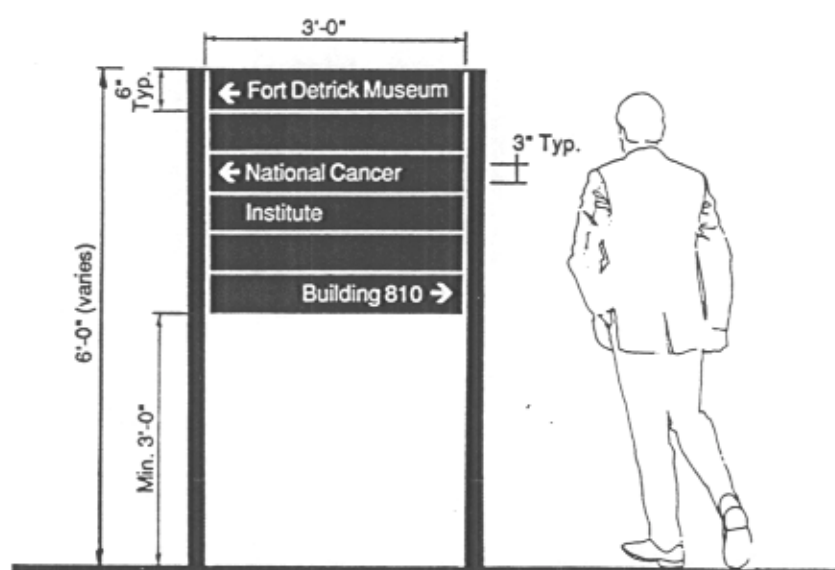


Figure 3-67: Pedestrian Directional Sign

Building Identification Sign

This type of sign must be placed in a prominent location to identify the building's number and names of the major occupants. A separate sign slat is used for each occupant. Two sign heights are generally used: 6'-0" posts for signs with four to six occupants; 5'-0" posts for signs with two to three occupants (see Figure 3-68).

Dimensions: Slats: 6" high x 3'-0" wide.

Color: Panel (background) to match *Spraylat* 20-313 Duranodic. Lettering to match *Spraylat* 20-01 White Gloss.

Message: Text: Upper- and lower-case Helvetica Medium, 2" capital-letter height, flush left.

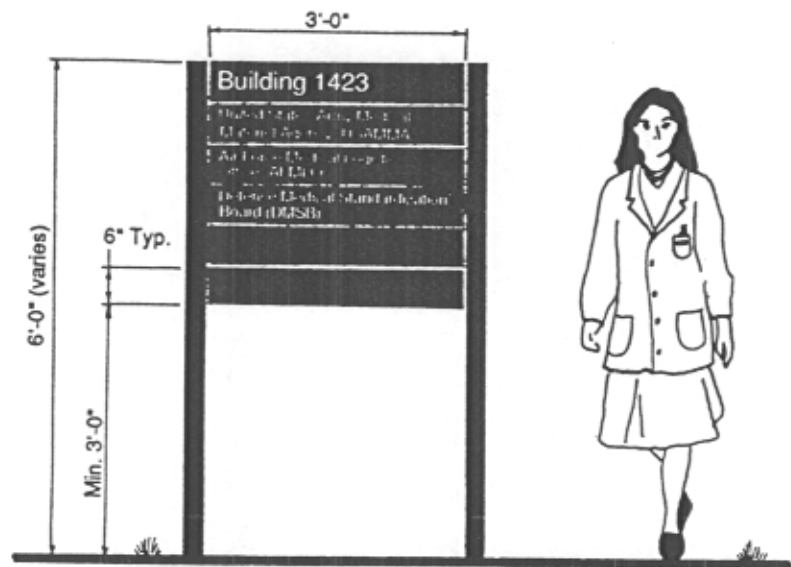


Figure 3-68: Building Identification Sign

DESIGN GUIDELINES

Signage

Building Entrance Sign

This type of sign must be placed next to doors to identify occupants and any special restrictions (see Figure 3-69).

Dimensions: 1'-6" x 1'-6", placed at eye level.

Message: Activity, upper- and lower-case Helvetica Medium, 4" capital-letter height, flush left. Building number, Helvetica Medium, 6" capital letter-height, flush left.

Color: Panel (background) to match *Spraylat* 20-313 Duranodic. Lettering to match *Spraylat* 20-01 White Gloss.

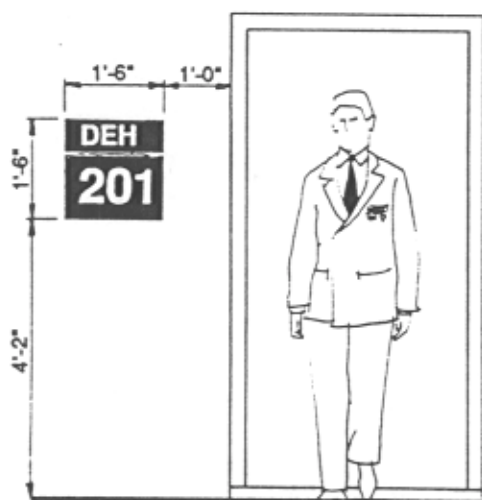


Figure 3-69: Building Entrance Sign

DESIGN GUIDELINES

Signage

Standard Traffic Sign

Highway standards are used for signs that regulate vehicular traffic on post. In the United States, the standards are described in the Manual of Uniform Traffic Control Devices published by the Federal Highway Administration. Any deviation from these commonly accepted standards for highway safety signs could create serious safety hazards. The use of signs that are familiar to motorists on roads outside the base should be continued within Fort Detrick.

In addition to signage, pavement markings form an integral part of the internal roadway regulatory system. These markings designate, among other things, pedestrian

crosswalks and rail-track crossings. The roadway markings should conform to standard practices and be visible at night as well as in the day. In areas of high traffic or potential conflict, these markings should be used in combination with signage.

The location as well as the design of highway signs should conform to standard practices. The general rule is to locate signs on the right-hand side of the roadway where the driver customarily looks for them. Signs in any other location should be considered supplementary to signs in the normal location. Special care should be taken to ensure an unobstructed view of each sign (see Figure 3-71).

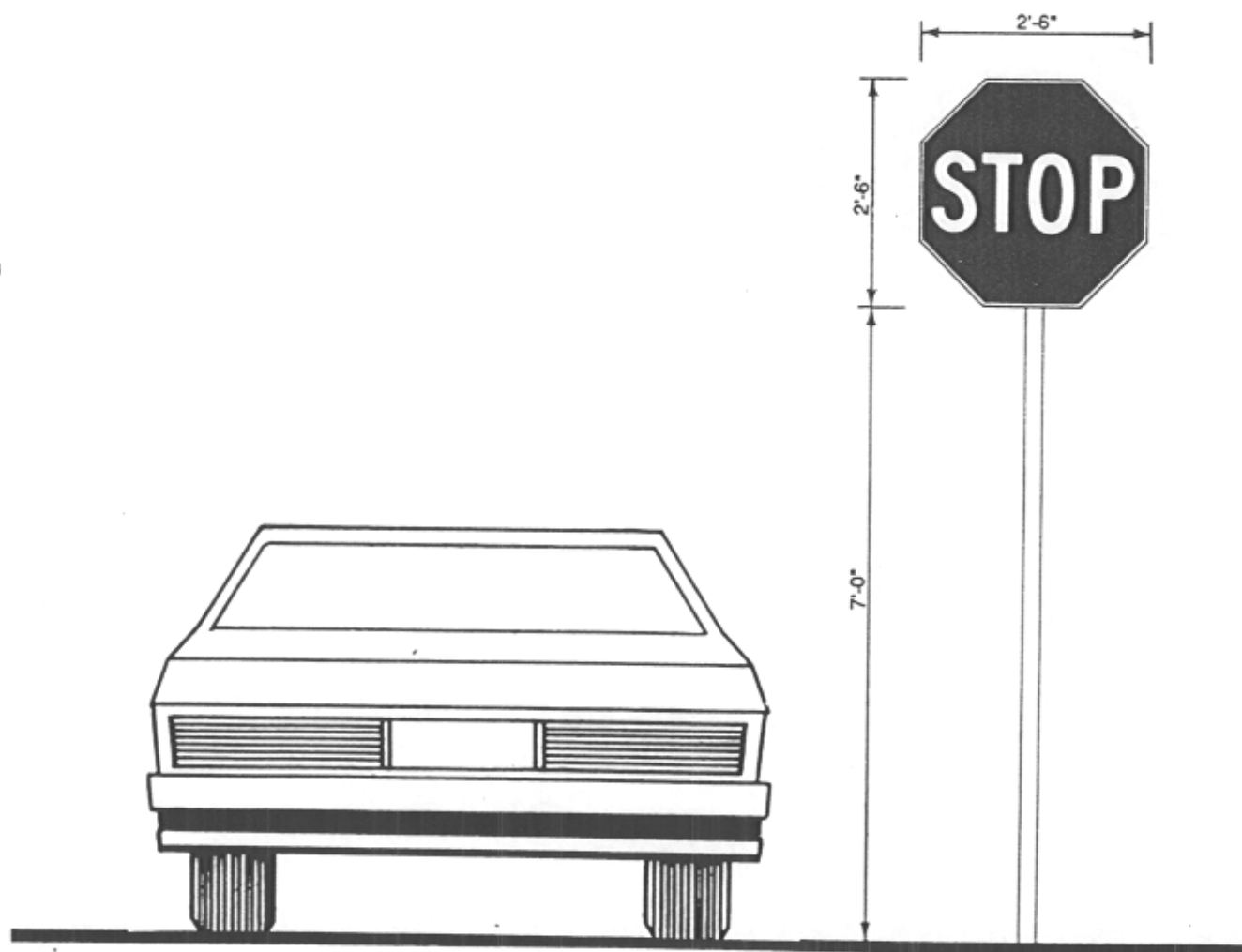


Figure 3-71: Standard Traffic Sign

Parking Lot Sign

This type of sign must be placed at all entries to a parking lot to identify the restrictions that apply to the lot (see Figure 3-72).

Dimensions: 3'-0" wide x 8'-0" high with a 5'-0" clearance from the bottom of the sign panel to the ground.

Sign Faces: 36" x 36" x .125" aluminum panels.

Message: Variable.

Color: Panel (background) to match *Spraylat* 20-313 Duranodic. Lettering to match *Spraylat* 20-01 White Gloss.

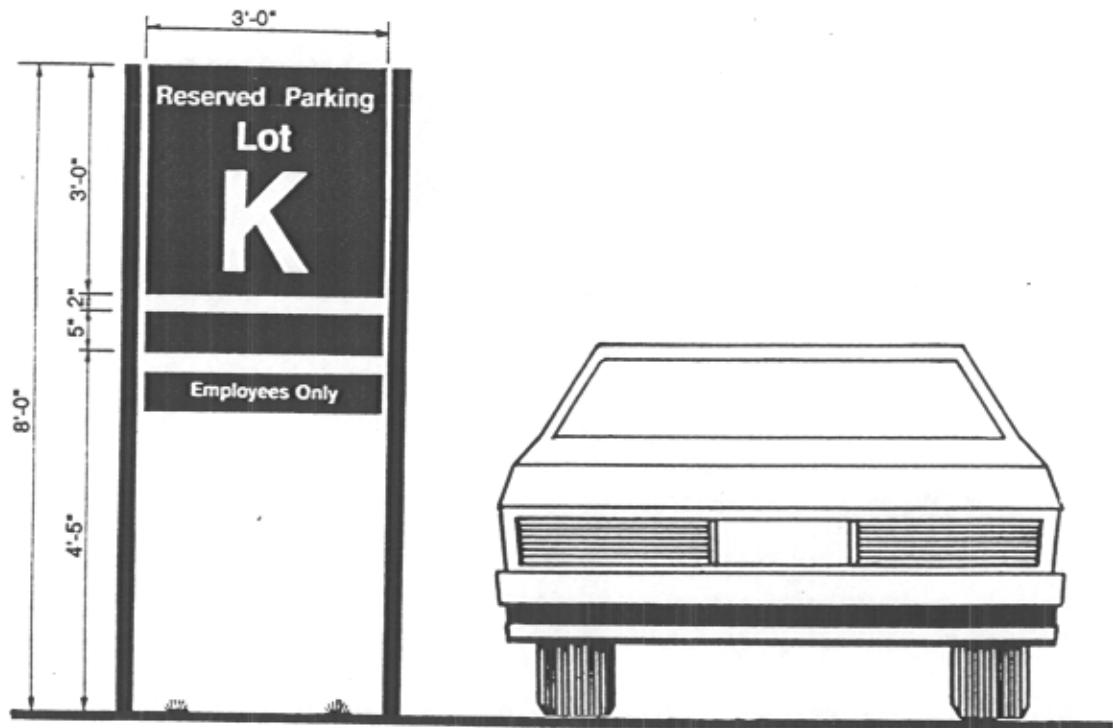


Figure 3-72 Parking Lot Sign

DESIGN GUIDELINES

Signage

Parking Space Sign

Various types of parking signage are employed to regulate parking areas for reserved, employee, visitor, and handicap spaces. Sign panels are used to identify general and restricted parking areas and to define specific parking regulations. A clear height of 7'-0" to the bottom of the sign panel is required where the view may be obscured; 5'-0" is acceptable otherwise. These types of signs generally use a pictographic

symbol as the primary graphic element. A message should also be placed on the sign to confirm the pictographic message or to add special information.

Within parking areas or lots, signage or curb markings may be needed to identify reserved spaces. In the absence of curbs, the information may be painted on the pavement. For both curb and pavement markings, stencils should be used to ensure uniformity (see Figure 3-73).

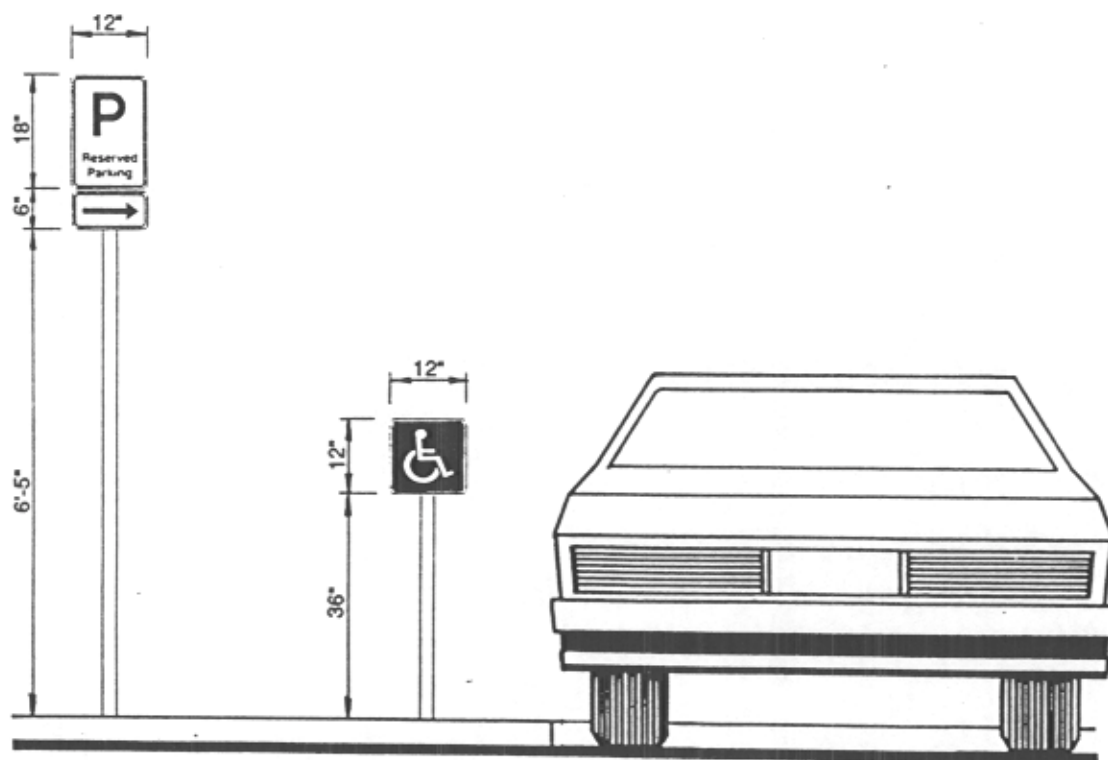


Figure 3-73: Parking Space Signage

Area B Entry Sign

The following sign must be used at the entry to Area B on Montevue Road. It should be attached to the chain-link fencing (see Figure 3-74).

Message: Upper- and lower-case Helvetica Medium, centered.

Color: Panel (background) to match *Spraylat* 20-313 Duranodic. Lettering to match *Spraylat* 20-01 Gloss White.

Dimensions: 4'-0" x 1'-6".

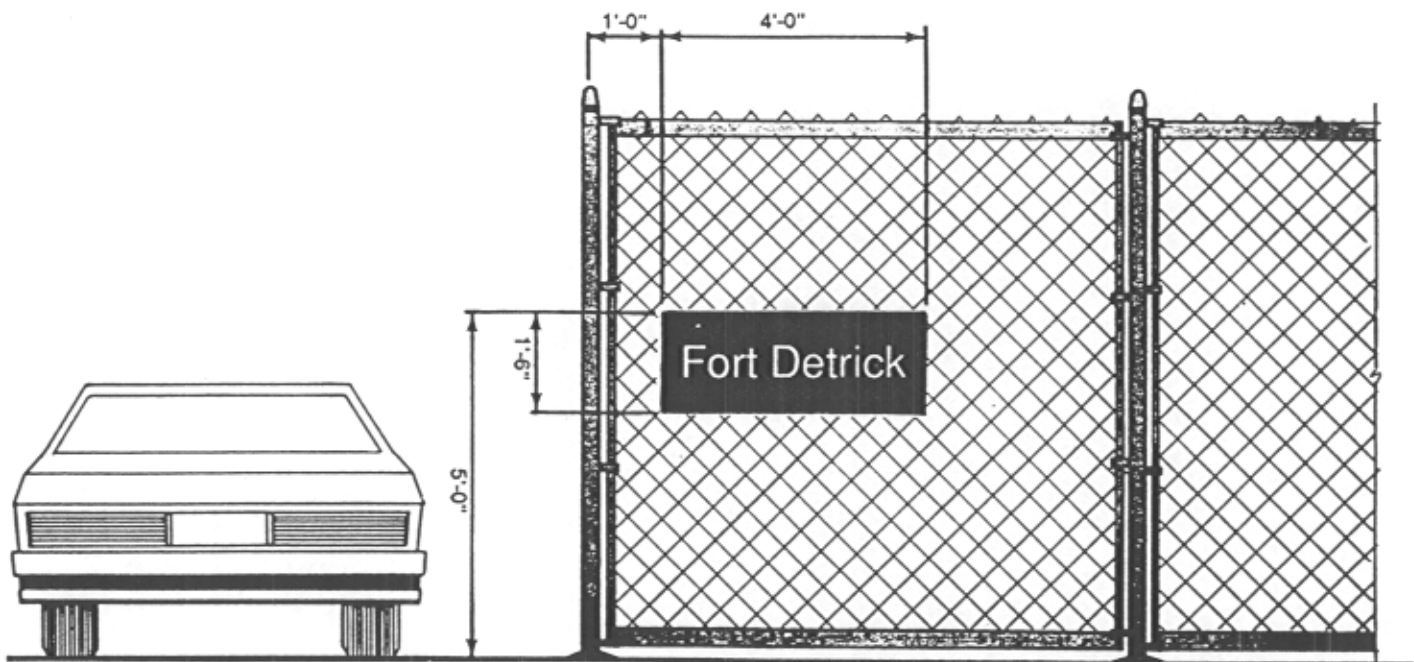


Figure 3-74: Area B Entry Sign

DESIGN GUIDELINES

Signage

Residential Sign

The following sign is to be used in the Family Housing Zone to identify the street address and building numbers of residential units (see Figure 3-75).

Dimensions: 5'-0" high post; panel 3'-0" x 1'-6"; 2' clearance to ground.

Message: Upper- and lower-case Helvetica Medium, flush left.

Colors: Posts and panel (background) to match *Spraylat* 20-81 Black Matte. Lettering to match *Spraylat* 20-01 White Gloss.

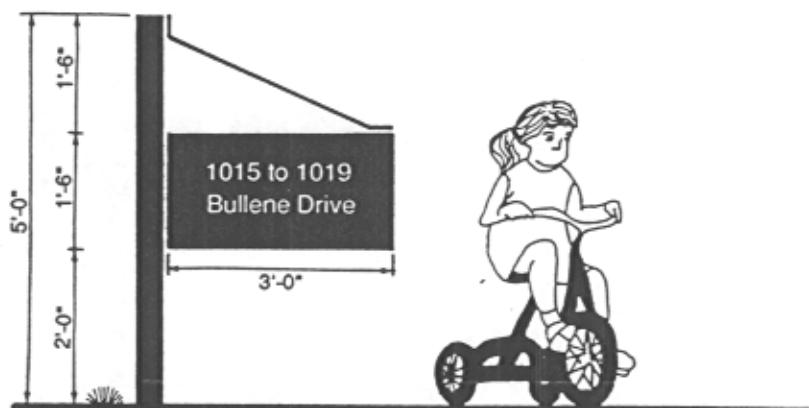


Figure 3-75: Residential Sign

PLANT MATERIALS

General Principles

Plant materials can be a valuable visual asset to Fort Detrick. All plants require maintenance and attention to assure their survival and to maintain the design intent. The plant materials at Fort Detrick currently receive less-than-adequate maintenance due to lack of resources available for this purpose. Every effort should be made to increase the budget designated for this purpose with the realization that without maintenance, plants will not thrive and the time and money invested in them will be wasted.

All overgrown and unhealthy plants and all plants that exist as individual balls should be systematically removed. These plants drain the maintenance resources.

A survey should be undertaken to identify these plants and plan for their removal.

Plants should be chosen with their natural height and form in mind so that pruning will not be required to maintain the desired effect.

The survival of plant material depends on their ability to adapt to environmental conditions. Seasonal changes in temperature, rainfall, and humidity, as well as soil properties must be considered when plant material are selected for Fort Detrick.

The following are the overall priorities that should guide decisions regarding plant materials projects:

- Trees should be planted along the fence lines of the Military Road, Rosemont Avenue, and eastern boundaries.
- Street trees should be planted along all primary streets and within the family housing zone.
- A greater variety of trees, including shade, flowering, and evergreen, should be planted in conjunction with any building project.
- The plantings at the entrances should be improved to include areas for seasonal flowers. These are appropriate areas for large displays of seasonal color.

Plant Palette

The following plant palette was selected based upon its suitability and adaptability to conditions in the Frederick, Maryland area which is in the *Arnold Arboretum Hardiness Zone 6*. All plants included in the plant palette are hardy within the minimum temperature range, -20 to -30 degrees Fahrenheit (F), of this zone. A wide variety of plants was selected to provide for a diversity of plant uses and characteristics. Plants of different sizes, shapes, foliage colors, flowers, and fruits provide the possibility for visual changes year round. The use of plant materials from this palette will contribute to the visual unity of the landscape throughout the post. See Tables 3-2 through 3-8 for characteristics of the following plants.

Small Deciduous Trees

Acer ginnala (Amur Maple)
A. tataricum (Tatarian Maple)
Cercis canadensis (Eastern Redbud)
Cornus florida (Flowering Dogwood)
C. mas (Corneliancherry Dogwood)
C. racemosa (Gray Dogwood)
Crataegus oxyacantha (English Hawthorne)
Eleagnus angustifolia (Russian Olive)
Magnolia x soulangeana (Japanese Magnolia)
M. stellata (Star Magnolia)

Medium Deciduous Trees

Carpinus betula 'Fastigata' (Upright European Hornbeam)
Crataegus phaenopyrum (Washington Hawthorne)
Gleditsia triacanthos inermis 'Shademaster'
 (Thornless Honeylocust)
Ostrya virginiana (American Hophornbeam)
Oxydendrum arboreum (Sourwood)
Pyrus calleryana 'Bradford' (Bradford Callery Pear)
Ulmus parvifolia (Chinese Elm)

DESIGN GUIDELINES

Plant Materials

Large Deciduous Trees

Acer platanoides (Crimson King Maple)
A. rubrum 'October Glory' (Red Maple)
A. saccharum (Sugar Maple)
Cercidiphyllum japonicum (Katsuratree)
Ginkgo biloba (Ginkgo, male grafted plants only)
Quercus phellos (Willow Oak)
Q. rubra maxima (Eastern Red Oak)
Q. palustris (Pin Oak)
Sophora japonica (Japanese Pagodatree)
Taxodium distichum (Bald Cypress)
Tilia cordata 'Green Spire' (Green Spire Linden)
T. tomentosa (Silver Linden)
Zelkova serrata (Village Green Zelkova)

Evergreen Trees

Chamaecyparis obtusa (Hinoki Falsecypress)
Ilex cornuta 'Burfordii' (Burford Holly)
I. opaca (American Holly)
Picea abies (Norway Spruce)
P. omorika (Serbian Spruce)
P. pungens 'Glaucous' (Colorado Blue Spruce)
Pinus bungeana (Lace Bark Pine)
P. nigra (Austrian Pine)
P. strobus (Eastern White Pine)
Tsuga canadensis (Canadian Hemlock)

Deciduous Shrubs

Aronia arbutifolia 'Brilliantissima' (Red Chokeberry)
Berberis thunbergii 'Atropurpurea' (Japanese Barberry)
B. thunbergii atropurpurea 'Crimson Pigmy'
(Crimson Pigmy Barberry)
Calycanthus floridus (Common Sweetshrub)
Clethra alnifolia rosea (Summer Sweet Clethra)
Cotoneaster apiculata (Cranberry Cotoneaster)
Euonymus alatus (Winged Euonymus)
E. alatus 'Compactus' (Dwarf Winged Euonymus)
Fothergilla gardenii (Dwarf Fothergilla)
Lonicera tatarica 'Alba' or 'Zabelli'
(Tartarian Honeysuckle)
Myrica pennsylvanica (Northern Bayberry)
Potentilla fruticosa (Bush Cinquefoil)
Rhododendron roseum (Roseshell Azalea)
Viburnum plicatum tomentosum 'Mariesii'
(Marie's Doublefile Viburnum)

Broadleaf Evergreen Shrubs

Ilex cornuta 'Burfordii Nana' (Dwarf Burford Holly)
I. cornuta 'Carissa' (Carissa Holly)
I. crenata 'Convexa' (Convexa Japanese Holly)
I. crenata 'Helleri' (Helleri Japanese Holly)
I. glabra 'Compacta' (Compact Inkberry)
Rhododendron catawbiense (Catawba Rhododendron)

Narrowleaf Evergreen Shrubs

Chamaecyparis obtusa 'Nana Gracilia' (Dwarf Hinoki Falsecypress)
Juniperus chinensis sargentii 'Glaucous' (Glaucous Sargent Chinese Juniper)
J. chinensis 'Sea Green' (Sea Green Juniper)
Pinus mugo (Mugo Pine)
Taxus cuspidata 'Nana' (Dwarf Japanese Yew)
T. media densiformis (Dense Yew)

Groundcovers and Vines

Euonymus fortunei 'Coloratus' (Wintercreeper Euonymus)
Juniperus horizontalis 'Plumosa' (Plumosa Creeping Juniper)
J. horizontalis 'Wiltoni' (Blue Rug Juniper)
J. horizontalis 'Bar Harbor' (Bar Harbor Juniper)
Liriope spicata (Liriope)
Lonicera japonica 'Halliana' (Hall's Japanese Honeysuckle)
Pachysandra terminalis (Pachysandra)
Parthenocissus quinquefolia (Virginia Creeper)
P. tricuspidata (Boston Ivy)
Vinca minor (Common Periwinkle)

Grass

Mixture:

- 60 percent Bluegrass (mix of three improved varieties, 20:20:20 ratio).
- 40 percent Perennial Ryegrass (mix of two improved varieties, 20:20 ratio).

DESIGN GUIDELINES

Plant Materials

Table 3-3: Plant Palette: Medium Deciduous Trees

Medium Deciduous Trees (30 to 40 feet)

			Outstanding Characteristics						Special Uses						Applications				
	Height Range (in feet)	Hardiness Zone*	Winter Form	Foliage	Bark	Fruit	Flower	Fall Color	Wet Soil Tolerant	Poor Soil Tolerant	Drought Tolerant	Pollution Tolerant	Full Sun Tolerant	Shade Tolerant	Lawn	Street/Parking	Screen	Mass	Accent/Specimen
<i>Carpinus betula</i> 'Fastigata' (Upright European Hornbeam)	30-40	4						●								●	●	●	
<i>Crataegus phaenopyrum</i> (Washington Hawthorne)	25-30	4	●			●	●	●								●	●		●
<i>Gleditsia triacanthos inermis</i> 'Shademaster' (Thornless Honeylocust)	30-70	4						●			●		●					●	
<i>Ostrya virginiana</i> (American Hophornbeam)	25-40	4	●		●			●							●	●			●
<i>Oxydendrum arboreum</i> (Sourwood)	25-30	4					●	●											●
<i>Pyrus calleryana</i> 'Bradford' (Bradford Callery Pear)	30-50	4					●	●			●	●	●		●	●			●
<i>Ulmus parvifolia</i> (Chinese Elm)	40-50	4	●		●			●										●	●

*Arnold Arboretum Hardiness Zone

Table 3-4: Plant Palette: Large Deciduous Trees

Large Deciduous Trees (over 50 feet)

			Outstanding Characteristics						Special Uses						Applications				
	Height Range (in feet)	Hardiness Zone*	Winter Form	Foliage	Bark	Fruit	Flower	Fall Color	Wet Soil Tolerant	Poor Soil Tolerant	Drought Tolerant	Pollution Tolerant	Full Sun Tolerant	Shade Tolerant	Lawn	Street/Parking	Screen	Mass	Accent/Specimen
<i>Acer platanoides</i> (Crimson King Maple)	40-50	3						●		●		●	●		●	●			
<i>Acer rubrum</i> 'October Glory' (Red Maple)	40-60	3						●					●		●	●			
<i>Acer saccharum</i> (Sugar Maple)	60-75	3						●					●		●	●			
<i>Cercidiphyllum japonicum</i> (Katsurataree)	40-60	4		●				●					●		●	●			
<i>Ginkgo biloba</i> (Ginkgo, male grafted plants only)	50-80	4						●				●	●		●	●			●
<i>Quercus phellos</i> (Willow Oak)	40-60	3						●	●			●	●		●	●			
<i>Quercus rubra maxima</i> (Eastern Red Oak)	60-75	4						●				●	●		●	●			
<i>Quercus palustris</i> (Pin Oak)	60-70	4						●	●			●	●		●	●			●
<i>Sophora japonica</i> (Japanese Pagodatree)	50-75	4				●	●			●		●			●				
<i>Taxodium distichum</i> (Bald Cypress)	50-70	4		●				●	●	●	●		●		●				●
<i>Tilia cordata</i> 'Green Spire' (Green Spire Linden)	60-70	3						●				●	●		●				
<i>Tilia tomentosa</i> (Silver Linden)	50-70	4		●							●				●				
<i>Zelkova serrata</i> (Village Green Zelkova)	50-80	5	●		●			●			●				●				

*Arnold Arboretum Hardiness Zone

DESIGN GUIDELINES

Plant Materials

Table 3-5: Plant Palette: Evergreen Trees

Evergreen Trees

			Outstanding Characteristics					Special Uses						Applications					
	Height Range (in feet)	Hardiness Zone*	Winter Form	Foliage	Bark	Fruit	Flower	Wet Soil Tolerant	Poor Soil Tolerant	Drought Tolerant	Pollution Tolerant	Full Sun Tolerant	Shade Tolerant	Lawn	Street/Parking	Screen	Mass	Accent / Specimen	
<i>Chamaecyparis obtusa</i> (Hinoki Falsecypress)	50-75	4	●	●								●						●	
<i>Ilex cornuta</i> 'Burfordii' (Burford Holly)	10-15	6/7	●	●		●						●	●			●		●	
<i>Ilex opaca</i> (American Holly)	15-30	5	●			●					●	●				●	●		
<i>Picea abies</i> (Norway Spruce)	40-60	2	●	●												●	●	●	
<i>Picea omorika</i> (Serbian Spruce)	50-60	4	●	●						●	●							●	
<i>Picea pungens</i> 'Glauca' (Colorado Blue Spruce)	90-135	2	●	●						●		●					●	●	
<i>Pinus bungeana</i> (Lace Bark Pine)	30-50	4	●	●	●							●						●	
<i>Pinus nigra</i> (Austrian Pine)	50-60	4	●	●	●												●		
<i>Pinus strobus</i> (Eastern White Pine)	50-80	3	●	●										●	●	●	●	●	
<i>Tsuga canadensis</i> (Canadian Hemlock)	40-70	3	●	●									●			●	●		

*Arnold Arboretum Hardiness Zone

Table 3-6: Plant Palette: Deciduous Shrubs

Deciduous Shrubs

			Outstanding Characteristics							Special Uses						Applications				
	Height Range (in feet)	Hardiness Zone*	Winter Form	Foliage	Bark	Fruit	Flower	Fall Color	Fragrance	Wet Soil Tolerant	Poor Soil Tolerant	Drought Tolerant	Pollution Tolerant	Full Sun Tolerant	Shade Tolerant	Hedge	Foundation	Screen	Mass	Accent/Specimen
<i>Aronia arbutifolia</i> 'Brilliantissima' (Red Chokeberry)	6-10	5				●	●	●		●	●			●					●	
<i>Berberis thunbergii atropurpurea</i> (Japanese Barberry)	3-6	4		●			●	●						●					●	
<i>Berberis thunbergii atropurpurea</i> 'Crimson Pigmy' (Crimson Pigmy Barberry)	2	4						●								●			●	●
<i>Calycanthus floridus</i> (Common Sweetshrub)	6-9	4					●		●		●					●			●	
<i>Clethra alnifolia rosea</i> (Summer Sweet Clethra)	3-8	3					●	●	●	●				●		●			●	
<i>Cotoneaster apiculata</i> (Cranberry cotoneaster)	3	4				●	●	●			●			●			●			
<i>Euonymus alatus</i> (Winged Euonymus)	10-20	3	●		●			●					●	●		●		●	●	●
<i>Euonymus alatus</i> 'Compactus' (Dwarf Winged Euonymus)	7-10	3	●		●			●					●	●		●	●		●	●
<i>Fothergilla gardenii</i> (Dwarf Fothergilla)	2-3	5					●	●									●		●	
<i>Lonicera tatarica</i> 'Alba' or 'Zabeli' (Tartarian Honeysuckle)	10-12	3				●	●												●	
<i>Myrica pennsylvanica</i> (Northern Bayberry)	5-12	2				●					●								●	
<i>Potentilla fruticosa</i> (Bush Cinquefoil)	1-4	2					●				●			●		●	●		●	
<i>Rhododendron roseum</i> (Roseshell Azalea)	2-8	3					●	●	●						●				●	●
<i>Viburnum plicatum tomentosum</i> 'Mariesii' (Marie's Doublefile Viburnum)	8-10	4				●	●	●								●			●	

*Arnold Arboretum Hardiness Zone

DESIGN GUIDELINES

Plant Materials

Table 3-7: Plant Palette: Evergreen Shrubs

Broadleaf Evergreen Shrubs

Broadleaf Evergreen Shrubs			Outstanding Characteristics					Special Uses						Applications				
	Height Range (in feet)	Hardiness Zone*	Winter Form	Foliage	Bark	Flower	Fragrance	Wet Soil Tolerant	Poor Soil Tolerant	Drought Tolerant	Pollution Tolerant	Full Sun Tolerant	Shade Tolerant	Hedge	Foundation	Screen	Mass	Accent / Specimen
<i>Ilex cornuta</i> 'Burfordii Nana' (Dwarf Burford Holly)	3-8	6/7	●	●		●						●	●	●	●		●	
<i>Ilex cornuta</i> 'Clarissa' (Clarissa Holly)	3	6/7	●	●											●			
<i>Ilex crenata</i> 'Convexa' (Convexa Japanese Holly)	4-9	5		●										●	●	●	●	
<i>Ilex crenata</i> 'Helleri' (Helleri Japanese Holly)	3-5	5		●											●		●	●
<i>Ilex glabra</i> 'Compacta' (Compact Inkberry)	3-5	3		●											●		●	
<i>Rhododendron catawbiense</i> (Catawba Rhododendron)	6-10	4		●			●						●				●	●

Narrowleaf Evergreen Shrubs

<i>Juniperus chinensis sargentii</i> 'Glaucua' (Glaucua Juniper)	3-6	4		●								●	●		●		●	
<i>Juniperus chinensis</i> 'Sea Green' (Sea Green Juniper)	3-6	4	●	●								●	●		●		●	●
<i>Pinus mugo mugo</i> (Mugo Pine)	4-8	2	●	●								●	●		●		●	
<i>Taxus cuspidata</i> 'Nana' (Dwarf Japanese Yew)	5-10	4	●	●							●	●	●	●	●	●	●	
<i>Taxus media densiformis</i> (Dense Yew)	4-8	4	●	●								●	●	●	●	●	●	

*Arnold Arboretum Hardiness Zone

Table 3-8: Plant Palette: Groundcovers and Vines

Groundcovers and Vines

			Outstanding Characteristics				Special Uses						Applications						
	Height Range (inches)	Hardiness Zone*	Winter Form	Foliage	Fruit	Flower	Wet Soil Tolerant	Poor Soil Tolerant	Drought Tolerant	Pollution Tolerant	Full Sun Tolerant	Shade Tolerant	Walls	Banks	Foundation	Mass	Accent/Specimen		
<i>Euonymus fortunei</i> 'Coloratus' (Wintercreeper Euonymus)	4-6	4	●	●				●			●	●	●	●	●	●			
<i>Juniperus horizontalis</i> 'Plumosa' (Plumosa Creeping Juniper)	12-24	3	●	●				●			●	●		●	●	●	●		
<i>Juniperus horizontalis</i> 'Wiltoni' (Blue Rug Juniper)	4-6	3	●	●				●			●	●		●	●	●	●		
<i>Juniperus horizontalis</i> 'Bar Harbor' (Bar Harbor Juniper)	8-18	3	●	●				●			●	●		●	●	●	●		
<i>Liriope spicata</i> (Liriope)	8-18	4		●	●	●			●		●	●			●	●	●		
<i>Lonicera japonica</i> 'Halliana' (Hall's Japanese Honeysuckle)	12-18	4				●					●			●		●			
<i>Pachysandra terminalis</i> (Pachysandra)	6-12	4		●		●						●			●	●			
<i>Parthenocissus quinquefolia</i> (Virginia Creeper)	vine	3		●			●	●		●	●	●	●	●		●			
<i>Parthenocissus tricuspidata</i> (Boston Ivy)	vine	4		●						●	●	●	●	●		●			
<i>Vinca minor</i> (Common Periwinkle)	3-6	4		●				●				●		●	●	●			

*Arnold Arboretum Hardiness Zone

DESIGN GUIDELINES

Plant Materials

Specifications

Plant Materials

Trees, shrubs, and groundcovers shall be in compliance with *American Standard for Nursery Stock* (ANSI Z60.1 publication). All plants shall be sound, healthy, and free from disease and insect pests or their eggs, and shall have normal, healthy root systems. Plants shall be dug with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root systems necessary for full recovery. Balls shall be securely wrapped with burlap and bound with cord. No balled and burlapped plant shall be planted if the ball is cracked or broken. Bare root plants shall be handled in a manner that protects the roots at all times. No plant shall be bound with rope or wire in a way that will damage the bark or break the branches.

To assure the quality of landscape materials, plants shall be provided with certificates of inspection as required by Frederick County. Submittals shall be made by the contractor to Fort Detrick's designated representative for all materials to be furnished. This may include such items as a certificate of inspection for plant materials; submittals of manufacturer's data or literature for tree wrap, antidesiccant, and steel edging; topsoil analysis report; planting schedule; soil amendments; fertilizers; and maintenance instructions. Fort Detrick shall reserve the right to inspect and reject plants prior to planting.

Planting Seasons

Generally, the planting seasons in the Frederick area extend from September 1 to July 1. Most trees, shrubs, groundcovers, and vines should be planted between these times. Lawn grasses should be seeded between mid-March and mid-June or September 1 and November 1.

No planting shall be performed while the soil is excessively wet or frozen.

Topsoil

Provide good quality topsoil that has been selectively excavated; is representative of soils in the vicinity that produce heavy crops, grass, or other vegetation; and is free from stones, underlying subsoil, clay lumps, objectionable weeds, litter, brush, matted roots, toxic substances, or any material that would be a hindrance to grading, planting, or maintenance operations.

Test all topsoil prior to use for organic content, percent of silt, sand, clay, and other foreign materials, such as rocks, roots, and vegetation.

Additional soil testing (agricultural soil test) should be performed to determine soil pH and phosphate and potash content. The landscape contractor is responsible for furnishing these tests in report form. The report should also indicate the amount and type of soil amendments necessary to bring the topsoil to specified levels.

All laboratory tests are to be submitted to Fort Detrick's representative for review.

Soil Preparation

Soil preparation and mixes must be provided in accordance with the results of soil test data. The contractor is to furnish the following soil amendments, fertilizers, and conditioners as dictated by the agricultural soil test.

Amendments

Lime: Provide raw ground limestone containing not less than 90 percent total calcium carbonates, with 98 percent passing a 20-mesh sieve and 50 percent passing a 100-mesh sieve.

Bonemeal: Provide commercial, finely ground, raw bonemeal containing 4 percent nitrogen and 20 percent phosphoric acid.

Gypsum: Furnish U.S. Grade Fine Gypsum.

Superphosphate: Soluble mixture of treated minerals, 20 percent available phosphoric acid.

Fertilizers

Phosphate and Potash: Provide a standard commercial product containing not less than 20 percent phosphoric acid and 10 percent potash and having a formula of 10-20-10.

Commercial Mixed Fertilizer: Provide a commercial fertilizer of 20-5-5 or similar grade, in composition uniform and freely flowing.

Urea: Provide ammonium nitrate having an analysis of 33 percent nitrogen, 0 percent phosphorus, and 0 percent potash. Provide fertilizer that is dry and freely flowing, suitable for application with standard fertilizer.

Lawn Areas: Provide fertilizer containing the following percentages by weight for lawn areas: 6 percent nitrogen, 14 percent phosphoric acid, and 6 percent potash.

Soil Conditioners

Peat: Provide a natural product of peat moss from a freshwater site, conforming to Federal Specification Q-P-166.

Sand: Provide clean sand that is free of toxic materials.

Planting Pits

There are a number of stresses on trees in the environment at Fort Detrick that limit the success of trees. The above-ground stresses—air pollution; high ambient temperatures; reflected light and reradiated heat from buildings, cars, and pavement; wind; low relative humidity; and physical damage from vehicles and pedestrians—are imposing. However, studies have shown that the overwhelming majority of problems can be traced to the poor soil environment.

Soil problems include soil compaction, poor aeration, drainage, high salt levels, elevated pH, and the presence of construction rubble and heavy metals. The most serious of these, for the survival rate of trees, is soil compaction. The detrimental effects of soil compaction include the reduction of pore space, available moisture, moisture absorption, and oxygen content. All of these factors affect the trees' growth and survival.

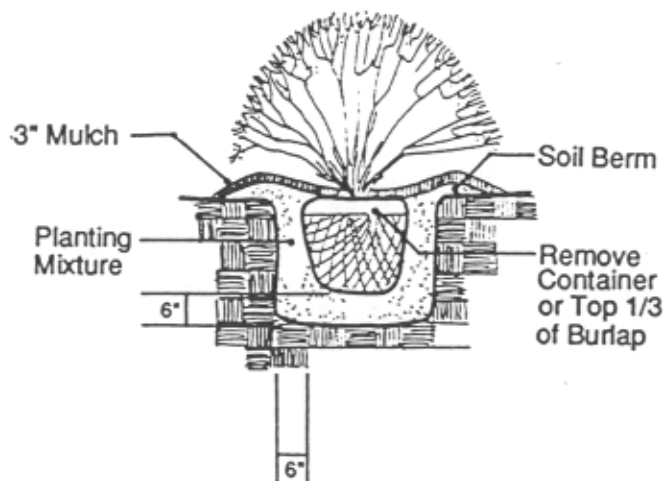


Figure 3-44: Shrub Planting Detail

Standard tree planting pits are not sufficient in size or design characteristics to overcome the numerous problems described above. In fact, they often compound these problems. The "typical" 4' x 4' pit is surrounded by compacted soil, so that water movement is restricted into this surrounding soil, creating the teacup effect, subjecting trees' roots to water-saturated, anaerobic soil conditions within the pit. The tree roots, in effect, drown. Conversely, the typical pit is vulnerable to drying out quickly during the warmer and dryer summer months, since root growth and penetration into the surrounding soil is restricted by compaction and other obstructions such as buildings or utility lines.

Tree pits can be improved, thereby improving the survival rate of trees, by providing adequate drainage and soil aeration. More generous dimensions are helpful as is provision for drainage.

Shrub and groundcover pits shall be excavated as illustrated (see Figures 3-44 and 3-45). Tree pits shall be excavated as illustrated (see Figure 3-46).

There are numerous benefits to be derived from grouping trees into planting islands. These islands, with their larger area, allow for a larger shared rooting space, a larger volume of soil, and a greater surface area for rainfall interception. These reduce stress by reducing the fluctuations in soil water and temperature.

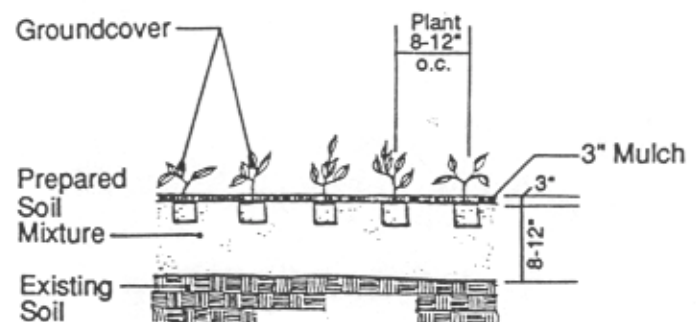


Figure 3-45: Groundcover and Vine Planting Detail

DESIGN GUIDELINES

Plant Materials

Planting Procedures

Planting

If the plant is balled, cut burlap away from the top of the ball and roll back into the top of the backfill. If the plant is in a container, cut the container away and discard. Set plants upright on a compacted cushion of topsoil mixture so that the top of the roots or ball will bear the same relation to grade as before transplanting. No filling will be permitted around the trunk or stems. Roots of bare root plants shall not be allowed to mat together, but shall be spread and arranged in their natural position and have the planting mixture worked in among them. All broken or frayed roots shall be cut off.

When the plant has been properly set, the pit shall be backfilled with planting mixture, and gradually filled tamped, and settled with water. Complete the backfill, wetting lightly and tamping to remove all air pockets so that the plant is firmly and completely bedded. Construct a shallow rim of earth (watering saucer) around the outer edge of the hole. Build the rim up so that the saucer will retain water.

Staking, Guying, and Wrapping

Staking, guying, and wrapping shall be completed immediately after planting. Stake trees under 3-inch caliper, and guy trees over 4-inch caliper with deadmen of tree anchors. Trunks of all deciduous trees of 2-inch caliper or over shall be wrapped with a standard tree wrap from the first branch down to the ground and securely tied in place.

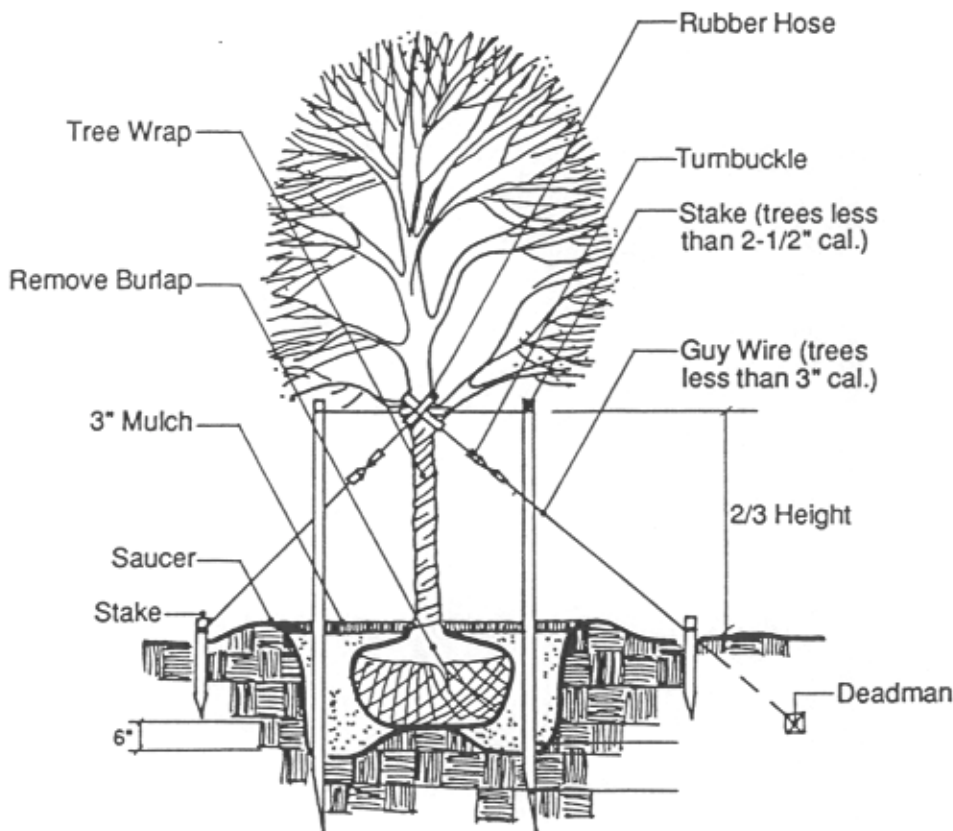


Figure 3-46: Tree Planting Detail

Mulching

Mulch within 48 hours after planting operations are complete. Fill plant saucer with shredded hardwood bark mulch, peat moss, bark chips, or other approved material to a depth of 2 to 3 inches. In groundcover areas, mulch bed to a uniform depth of 2 inches.

Fertilizing

Newly transplanted plant materials generally do not require fertilizing.

Watering

All plants shall be thoroughly soaked after planting. Newly planted areas should be watered, depending on the weather, at least once a week to provide necessary moisture for development of the new root system. After each watering, all beds should be raked and left in a finished manner.

Pruning and Repair

The following standard pruning procedures should be followed. When planting has been completed, all dead and broken branches shall be removed by pruning and the injuries repaired. The amount of pruning should be limited to the minimum necessary to remove dead or injured twigs and branches and to compensate for the loss of roots from transplanting. Pruning shall be done in a manner that will not change the natural habit or shape of the plant. All cuts should be made flush, leaving no stubs.

Cleanup

After planting operations have been completed, remove all excess soil, debris, and waste materials, and leave the planted area in an orderly fashion.

Plant Protection

Tree Protection

Trees are a valuable asset to Fort Detrick. Careful guidelines must be followed to protect them when construction takes place. New construction or renovation work should avoid destroying mature trees. Where construction is necessary near mature or valuable trees, they must be protected to prevent scarring of the tree and soil compaction over the roots. Soil compaction is a major cause of stress on the tree and can eventually lead to the tree's death.

There are three different methods of protecting the tree during construction, depending upon the conditions. The most comprehensive protection is achieved if the tree is encircled by a wooden protective fence at the dripline (outside the edge of the branches) of the tree. This protects the roots, branches, and trunk (see Figure 3-47).

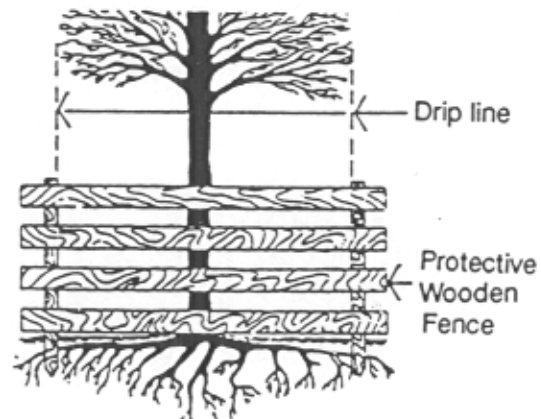


Figure 3-47: Protective Wooden Fencing

DESIGN GUIDELINES

Plant Materials

Another method of protected smaller trees or trees in a confined space is the installation of wire fence located 10' from the tree trunk (see Figure 3-48).

In very confined areas where construction vehicles must be operated close to trees, a protection device is wrapped around the tree. Car tires separate wooden planks from the trunk creating a bumper if a vehicle hits the tree. The root system is protected by temporary steel plates. These plates spread the compaction forces of a construction vehicle over a larger area, reducing spots of heavy compaction on the roots (see Figure 3-49).

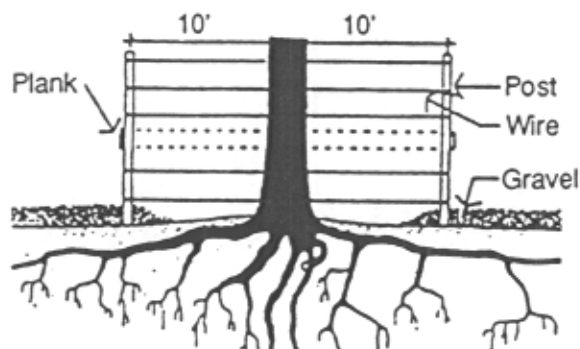


Figure 3-48: Protective Wire Fencing

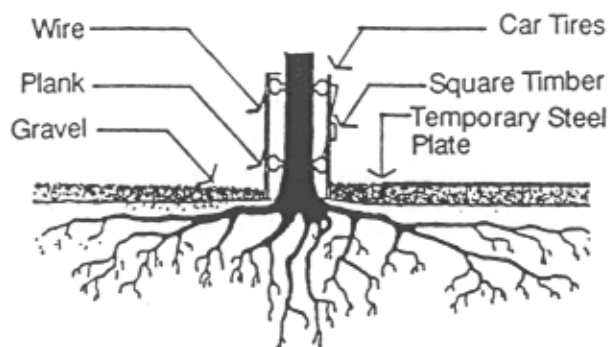


Figure 3-49: Protection Surrounding the Trunk

Protection Against Overfill

Overfill is additional dirt or gravel placed around the tree to alter the existing grade. Overfilling often kills the tree because it reduces the amount of air and water a tree receive. If overfill is necessary, the following precautions must be taken (see Figure 3-50):

- One-third to one-half of the root area is to be covered with porous material, the other areas are covered with rich top soil.
- Drain pipes for ventilation are also installed.

Protection of Root During Short Term Digging

Digging in root areas should generally be done only by hand and not nearer than 8' from the trunk of the tree. The roots are to be cut cleanly by a sharp knife. Any cut root shall be sealed. Roots shall be protected against drying out and frost damage while uncovered.

Protection of Root Areas During Installation of Utility Lines

During installations of utility lines, root areas shall be penetrated only by drilling through the root area or by manual excavation of the trench. Both techniques are illustrated below. Preferably, the utility conduit should be thrust under the root system instead of cutting a trench through the roots. To avoid root dehydration, pipes shall be laid and the area backfilled immediately (see Figure 3-51).

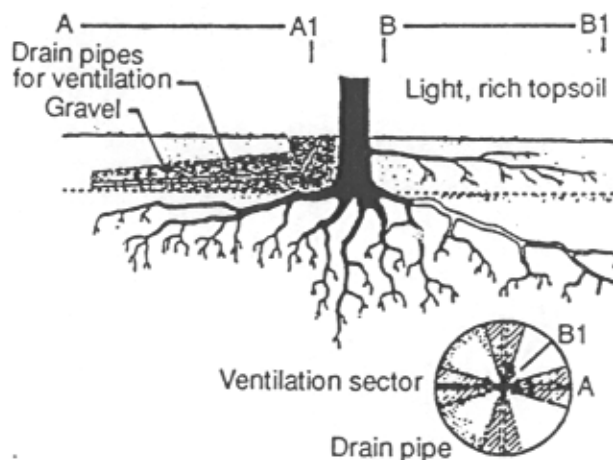


Figure 3-50: Protection From Overfill

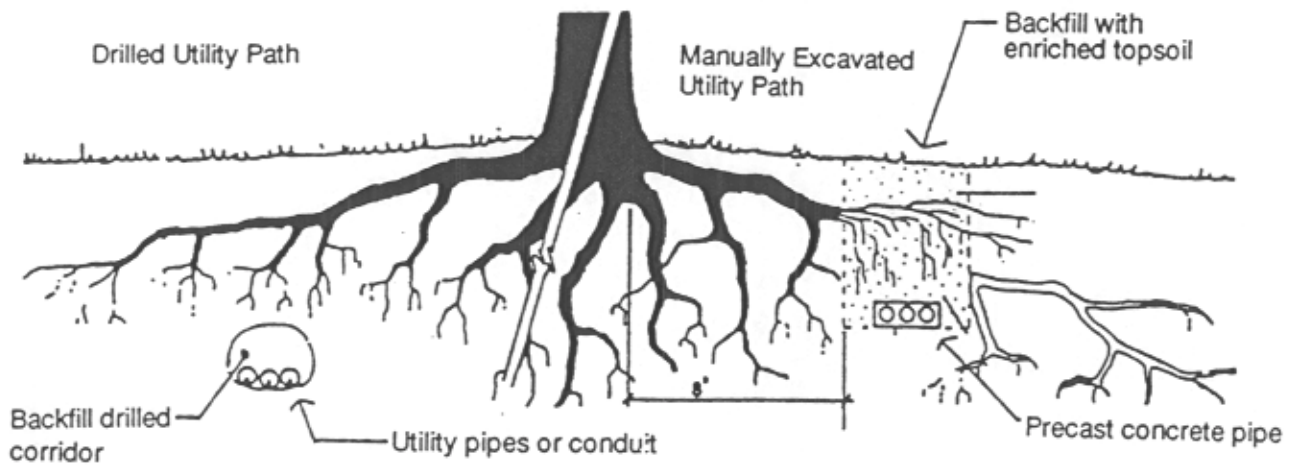


Figure 3-51: Drilled and Manually Excavated Utility Installation

Protection During Drought

During construction, there may be water table reductions which occur during the growing period. If the construction period lasts longer than 3 weeks and there is not sufficient rainfall, the trees shall be watered weekly (see Figure 3-52).

Pavement in Root Areas

If trees are to be planted in areas paved with nonporous materials such as asphalt or concrete or if areas with existing trees are to be paved with either material, half of the diameter of the root area (or half the tree branch drip line) shall be

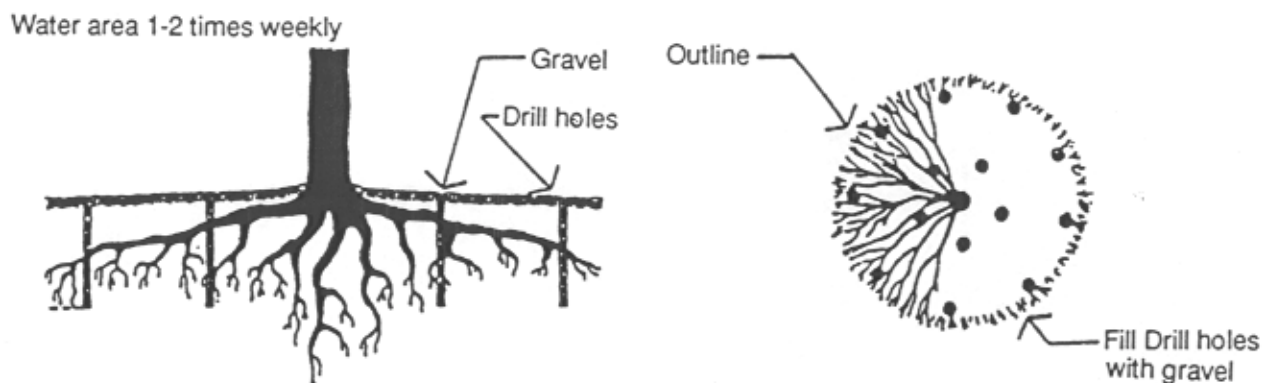


Figure 3-52: Dehydration Protection

DESIGN GUIDELINES

Plant Materials

covered with porous material. This porous material shall be sand or gravel topped with some type of unit pavers. This paving will allow the tree to receive adequate air and water. Drain pipes are also recommended for air and water movement (see Figure 3-53).

Shrub Protection

The same protection guidelines apply to grouping of shrubs that was described for trees. However, since shrubs are generally smaller, they may often be removed and stored during construction. The shrub should be removed when it is dormant and the root ball should be intact. This type of work should be done by a qualified nurseryman or landscape contractor.

Landscape Considerations

All the mechanics for introducing plant materials into the environment are too numerous to list for purposes of this document. A professional, such as a landscape architect, landscape contractor, or nurseryman, should be consulted prior to any landscape planting. However, there are some basic considerations concerning placement, choice, and maintenance that should be observed by the designer. In addition, all Army security and safety criteria must be taken into account because they will impact all planting designs. The following is a list of fundamental considerations for the use of plant materials at Fort Detrick.

- Avoid the use of potentially dangerous plants, such as those having large thorns or poisonous fruit. (These have been omitted from the plant palette).
- Overhead materials should be selected for their particular characteristics. Avoid materials that have tendencies toward dropping excessive debris or are susceptible to drooping or breaking under heavy snow or wind loads.
- Plant materials may affect snow and ice melt from walkways and stairs. Consider plants' mature shadow patterns during winter months prior to deciding on final locations. Snow removal and storage must also be considered because snow stored in planting areas can damage plant materials.
- Along roadways, avoid the use of species that are sensitive to salt damage.
- Maintain a minimum of 8'-6" vertical clearance between low tree branches and walls, sitting areas, pedestrian paths, etc.
- Note that improper location or poor maintenance of plant materials can quickly lead to a reduction in the efficiency of lighting systems.
- Many trees with shallow or surface root systems will heave up or break walkway surfaces. Use caution when choosing these varieties and their subsequent locations.

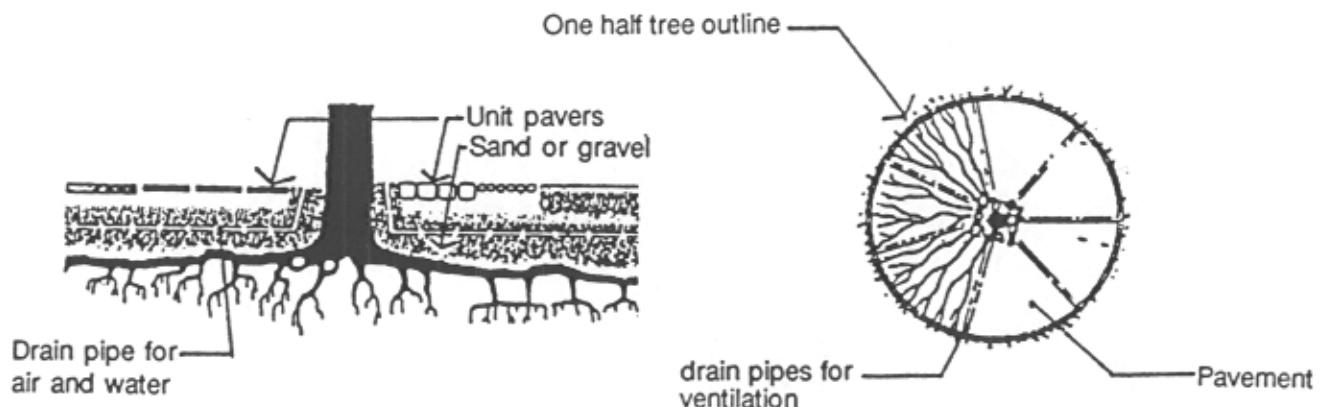


Figure 3-53: Trees Planted In Non-Porous Pavement

Avoid placing plant materials over or near underground utilities. If the plants have root systems that characteristically cause damage to pipelines, cables, or sewers, their use should be avoided. In all cases, prior to initiating a landscape plan, the designer should verify the location of existing facilities. Plants should be placed to avoid root interference with sewers, water lines, and buried cables.

- Trees must be placed according to mature height and spread to avoid interference with power lines, etc. Where there are numerous utilities, a utility easement should be established, free of all plantings other than lawn.
- Creeping groundcovers, vines, and other invasive materials can be troublesome if not contained. Keep them off buildings, walkways, steps, ramps, signs, and lighting fixtures.
- Plantings should be located to avoid interference with public rights of way, utilities, or streets, particularly at intersections where visual obstructions may occur. As a rule of thumb, plantings should be contained within Fort Detrick property boundaries, and should not intrude on the adjacent rights of way. Federal, state, and local sight-line criteria should be observed as a minimum at intersections and points of entry.

Maintenance

Maintenance is a primary concern for any landscaped environment. The quality of maintenance determines the ultimate success or failure of a design. The landscaped environment is not static and requires ongoing maintenance both to the plant materials and structural components, to fulfill its desired goal.

Lawn Maintenance

Grass heights are to be maintained between 2-1/2 and 3". Cutting the grass too short weakens it and reduces its ability to compete with weeds and to stand stress conditions such as traffic and drought. Turf will be mowed once a week or as deemed necessary by weather and season (see Maintenance Schedule) No more than one-third of the height of the turf is to be removed at one mowing. Grass blades that are cut at the correct height shade grass roots from midsummer heat, encouraging deeper, healthier roots (see Figure 3-54). To reduce maintenance requirements, edging or precast units shall be used as mowing strips along building edges and landscape beds (see Figure 3-55).

Cool season grasses (bluegrass, fescue, ryegrass, etc.) are to be fertilized heavily in the fall and then again lightly in the very early spring if needed. The mix and rate of fertilizer to be applied is to be determined on a case by case basis. Many factors affect fertilizer requirements. Soil tests and observation of the turf by a trained professional are two ways fertilizer requirements can be determined.

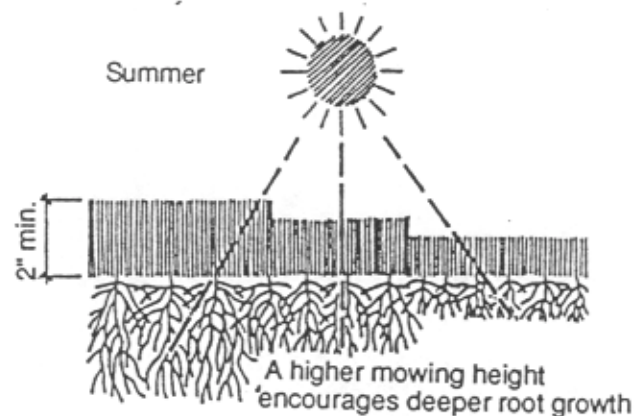


Figure 3-54: Turf Growing Height

Shrub Maintenance

If shrubs are maintained in an actively growing, healthy state, insects and disease will be kept to a minimum. Fertilizing and pruning are the most frequently required maintenance items for shrubs.

Trimming shall follow the natural line and form of the plant. Shrubs shall not be trimmed to severely structured shapes. To reduce maintenance, plants shall be installed close enough to form a mass and shall be trimmed as a group rather than as individual plants.

Deciduous plants are pruned anytime during the dormant period except for plants that bloom in early spring. These plants are pruned after flowering because buds are set on the previous year's growth. It is best to prune evergreens just before spring growth starts.

A fertilizer heavy in nitrogen is to be applied in the spring for top growth, and a fertilizer heavy in potassium is to be applied in the fall to encourage root growth. Apply most of the fertilizer away from the trunk and near the dripline where most of the feeder roots are located.

DESIGN GUIDELINES

Plant Materials

Maintenance Schedule

The following maintenance schedule has been formulated to assist in planning the Fort Detrick landscape maintenance program.

Winter

Flowers: Plan seasonal flower areas for the upcoming season. Ensure that perennial beds are properly protected with mulch.

Lawn: Plan lawn program for the upcoming year. Repair tools and equipment.

Groundcovers and Vines: Prune dead, woody vines during dormant season. Protect plants with mulch during freezing weather if no snow cover is present.

Trees and Shrubs: Protect easily damaged plants from the weight of snow. Water plants if the season has been dry and the ground is not frozen. The best watering practice is a slow soak. Prune summer- and fall-blooming plants while they are still dormant.

Spring

Flowers: Conduct soil tests on all flower beds. Divide crowded perennials after the end of flowering. Plant annuals in late spring, fertilize with a water-soluble fertilizer (5-10-5), and begin weed control after planting.

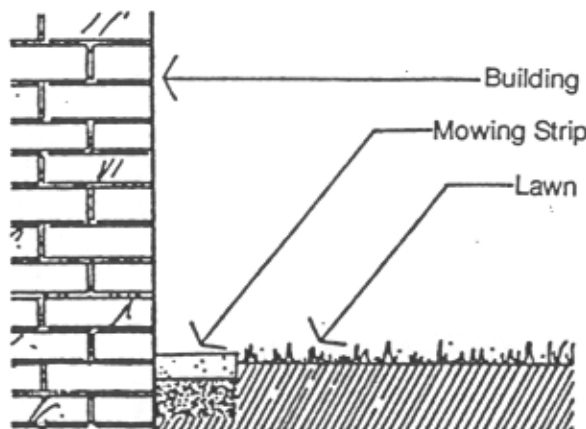
Lawn: Begin major lawn-care program. Mow to remove excess old growth; test soil, adjust pH to 6.5; rake, top-dress, and seed bare spots; overseed if this was not done the previous fall; dethatch and aerate lawn areas at 3- to 4-year intervals.

Mowing schedule:

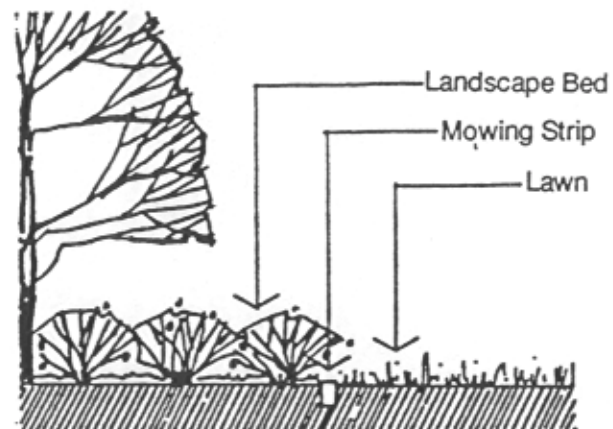
- Improved Grounds: Minimum height 2 inches, maximum height 4 inches.
- Semi-improved Grounds: Minimum height 3 to 4 inches, maximum height 6 to 8 inches. Mow on an average of once every 2 to 4 weeks during rapid growth periods or when a height of 6 to 8 inches has been reached; never remove more than one-fourth of the height at one time, since this will damage the leaf blade.
- Unimproved Grounds: Mow a minimum of twice a year.

Weed and Pest Control:

- Apply pre-emergent control for knotweed and crabgrass; check for chickweed growth; control wild garlic, onion, plantain, and dandelion; apply chemicals for grub control.



Mowing Strip By Building



Mowing Strip By Landscape Bed

Figure 3-55: Mowing Strips

Groundcover and Vines: Remove winter-damaged foliage. Fertilize plants. Apply new 3- to 4-inch layer of mulch.

Trees and Shrubs: Finish pruning plants that bloom after June 30. Fertilize after the ground thaws. Apply new 3- to 4-inch layer of mulch. Prune evergreens before new growth spurt so that cuts will be quickly covered. Prune early-spring-flowering plants after the end of their flowering season.

Summer

Flowers: Check flowers closely for insects. Continue fertilizer and weed-control schedule. Water as needed. Remulch beds to conserve moisture and control weeds.

Lawn: Water lawns as needed. Raise mower height to 3 inches for improved areas.

Groundcovers and Vines: Water as needed.

Trees and Shrubs: Finish pruning spring flowering shrubs. Water as needed. Reapply mulch as needed to conserve moisture and lower soil temperature. Fertilize broadleaf evergreens after blooming with a 5-10-5 fertilizer for acid-loving plants.

Fall

Flowers: Continue to water as needed. Clean up annual beds and plow under at the end of the season. Beds may be mulched or planted with winter rye grass to add nutrients. Plant spring-flowering bulbs.

Lawns: Test soil pH, fertilize based on soil test, dethatch, aerate, top-dress, and reseed. Set mower height for 2 inches in improved lawn areas. Remove leaves from grass. Water so that the turf begins the dormant season in a moist condition.

Groundcovers and Vines: Continue to water as needed until the ground freezes. Remove dead leaves, twigs, branches, and other debris. Remulch.

Trees and Shrubs: Rake fallen leaves and make a compost pile. Continue to water as needed until the ground freezes. Fertilize trees and shrubs that are not receiving fertilizer from application to other areas. Remulch.

DESIGN GUIDELINES

Plant Materials

Pruning

Shrub Pruning

Do not prune shrubs flat across the top, straight down the sides, or into individual globes (see Figure 3-56). The natural shape of the plant is to be preserved. Reduce height and width by pruning the longest branches back to the base of the plant. This practice encourages new growth from the center of the shrub, making it fuller.

Hedges are to be pruned wider at the bottom than at the top to allow sunlight to reach lower branches, preventing bottom dieout and legginess (see Figure 3-57).

Tree or Large Shrub Pruning

When shrubs and multi-stem trees need thinning, surplus stems shall be removed from the base instead of trimming the entire plant to an arbitrary height (see Figure 3-58).

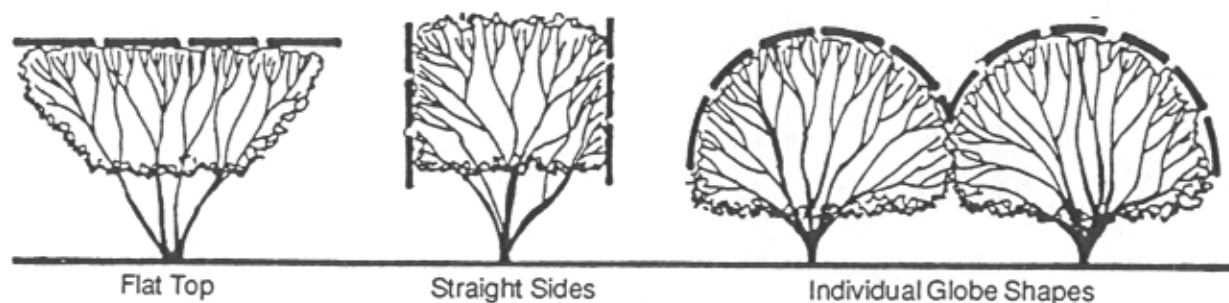


Figure 3-56: Improper Pruning Practices

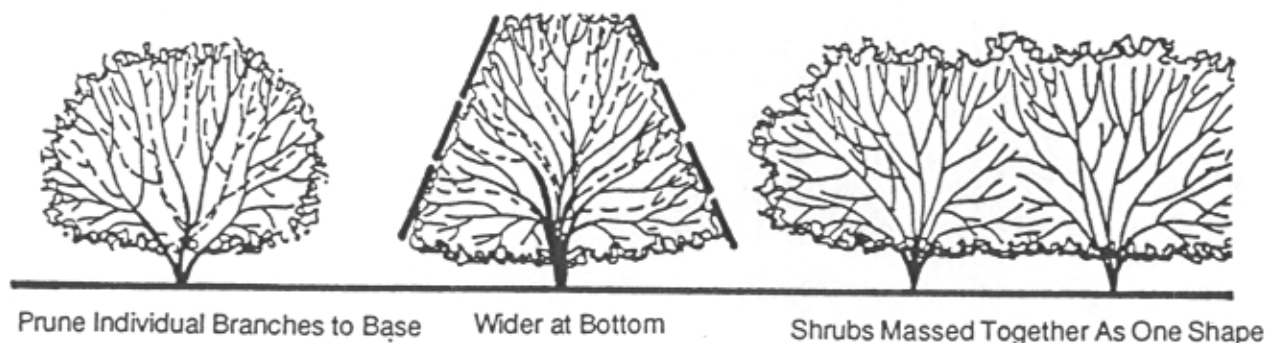


Figure 3-57: Proper Pruning Practices



Figure 3-58: Multi-Stem Pruning

rees or large shrubs shall be pruned at planting, and thereafter periodically to improve their shape.

It is possible to reduce the height and spread of a tree and still maintain its natural shape (see Figure 3-59).

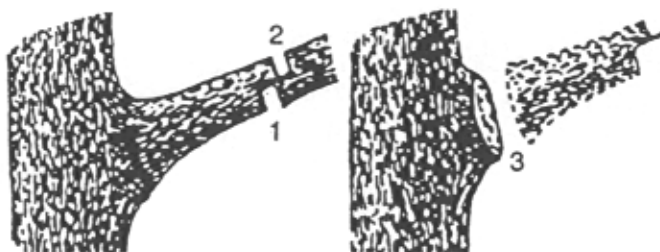
Remove a large limb by making three cuts (see Figure 3-60).

- 1 Make the first cut (undercut) on the bottom of the branch 12-24" from where the branch meets the trunk.
- 2 Make the second cut on the top of the branch within 1" of the undercut.
- 3 Make the final cut just beyond the outer portion of the branch collar. The first two cuts were necessary to remove the weight of the branch and allow the third cut to be clean, preventing ripping.

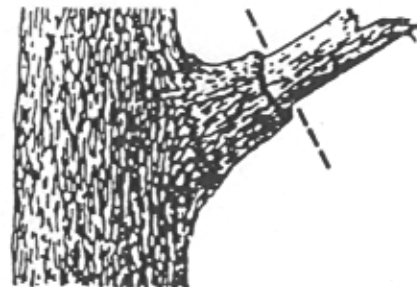
A dead branch stub that has a collar of live wood should be cut just at the outer edge of the collar (see Figure 3-60).



Figure 3-59: Pruning To Maintain the Shape of the Tree

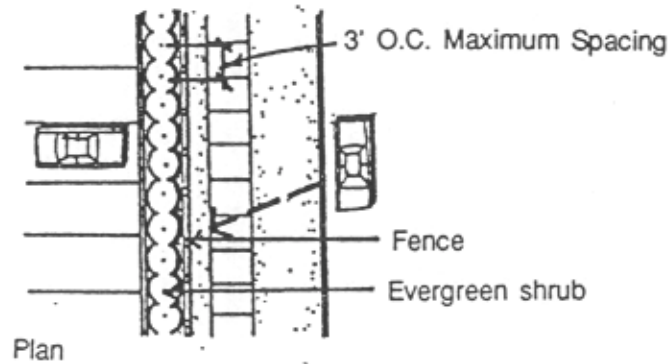
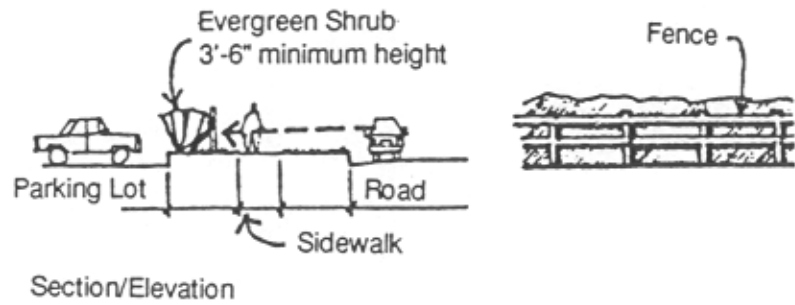


Limb Pruning

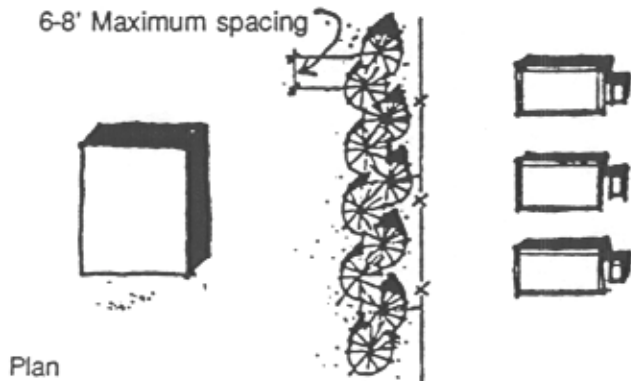
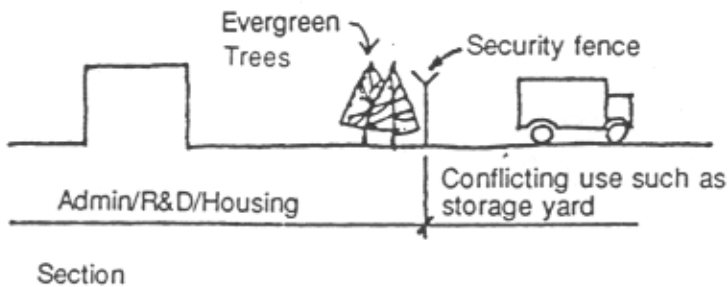


Dead Wood Removal

Figure 3-60: Correct Procedures for Removing A Large Tree Limb



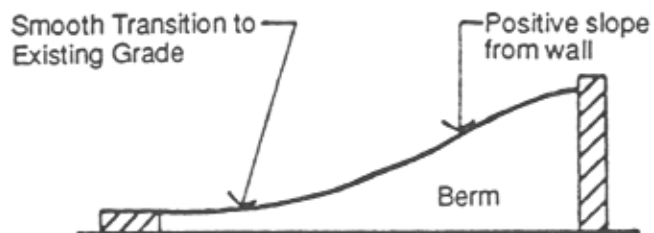
Screen Parking Lot Edges



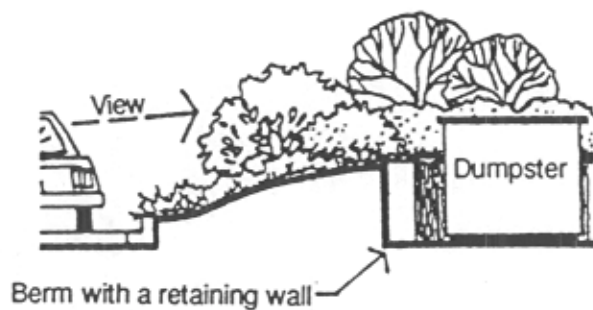
Screen and Separate Adjacent and Conflicting Uses

DESIGN GUIDELINES

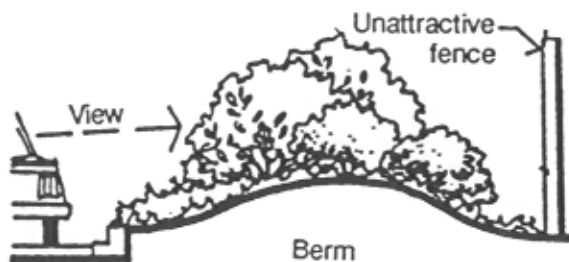
Plant Materials



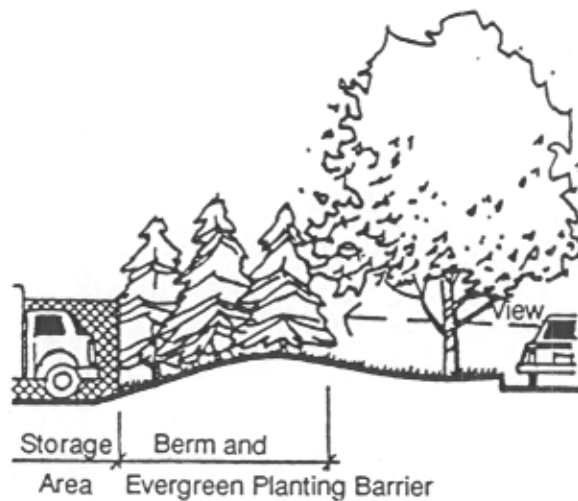
Section of Typical Berm



Berm and Vegetation Screen of Dumpster



Berm and Vegetation Screen of Unattractive Fence



Berm and Vegetation Screen of Vehicular Storage

PARKING

General Principles

Parking must be provided for a variety of needs at Fort Detrick: all-day parking must be provided for employees within a reasonable distance from the building in which they work; short-term parking is required for visitors near entries to the main facilities they frequent; parking areas are needed in the Family Housing Zone that are appropriate in scale and image to this setting; and, parking is needed for trucks and various types of equipment in the industrial areas. The overall goals for parking are:

- Coordinate the location of all parking areas with the *Fort Detrick Storm Water Management Plan* and *Fort Detrick Environmental Baseline Study*.
- Separate parking from the streets both visually and physically.
- Eliminate pull-in parking along streets.

Parking lots should be sited in areas of need. As new buildings are built, provide parking near these structures and eliminate older, underused lots. Parking lots are to be shared whenever possible by facilities with different hours of operation. The total amount of parking needed for those facilities may be reduced accordingly.

- Site the parking lots to be subordinate to the buildings.
- Provide access to the major entries of the buildings.
- Provide adequate pedestrian circulation through and around the parking areas.
- Parking lots should be a series of medium to small lots, separated by planting islands, grade changes, etc.
- Screen the parking area from prominent view both within and outside the post.
- All permanent parking areas must designate parking spaces with white striping (doubled striping is preferred) to organize the lot and to maximize its use.

Provide visitor and handicap parking near the entries to buildings.

- All lots must be identified with signage that designates its use.
- Finished grades must be one percent or greater. Transverse slopes are to be 4 percent or less.

Paving Materials

Parking lot pavement shall be asphalt, used in conjunction with cast-in-place curb or cast-in-place curb and gutter units.

In areas where parking is on an infrequent basis or has a lower capacity (such as at the Nallin Farm), grass pavers or gravel may be used. Grass pavers may be concrete or green, high density polyethylene plastic with UV inhibitors. Gravel should be compacted, processed aggregate of a locally available material. In no instance is it permissible to park on grassed areas without pavers or gravel.

Handicapped Access

Fort Detrick shall provide handicapped access, in accordance with *Federal Standard-795, Uniform Federal Accessibility Standards*, around all public buildings. This should include reserved parking near entrances and ramps to allow wheelchairs to make the necessary grade changes over curbs and steps.

DESIGN GUIDELINES

Parking

Parking Lot Location

Parking lot location is of great importance to the functional and aesthetic aspects of the buildings and areas they serve. The transition from street to building entrance helps form the first impressions for users approaching the building by automobile.

Parking areas should be located to the rear and sides of buildings when space permits. Visitor parking is to be provided in close proximity to the primary entrance of the building. When side or rear parking sites are not feasible, the parking must not block the view or the areas directly in front of the main entrance. The parking lot must be subordinate to the building (see Figure 3-20).

Drop-off areas should be considered for all large buildings. Other buildings such as community centers, childcare facilities, or medical centers may also require drop-off areas.

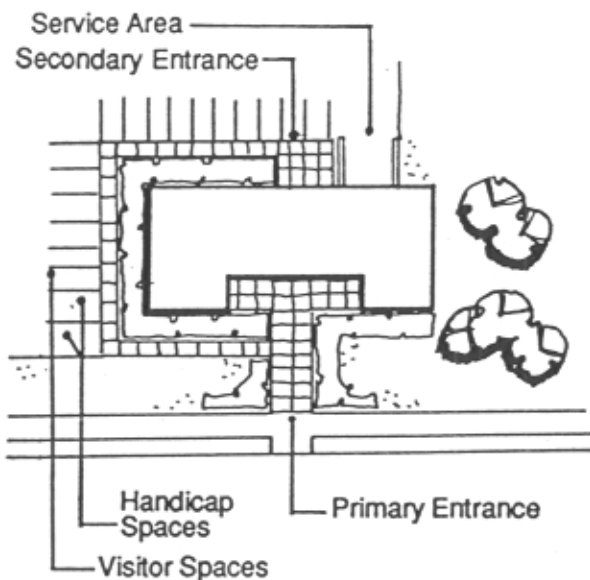


Figure 3-20: Parking Lot Orientation

Pedestrian Circulation

Generally, the preferred parking lot orientation for pedestrian circulation is parking bays parallel to the pedestrian circulation flow across lanes of traffic.

When pedestrian flow must be perpendicular to bays, provisions for easy pedestrian circulation across bays must be provided. Islands are necessary to accommodate pedestrian traffic toward building entrances and to provide necessary handicapped access (see Figure 3-21).

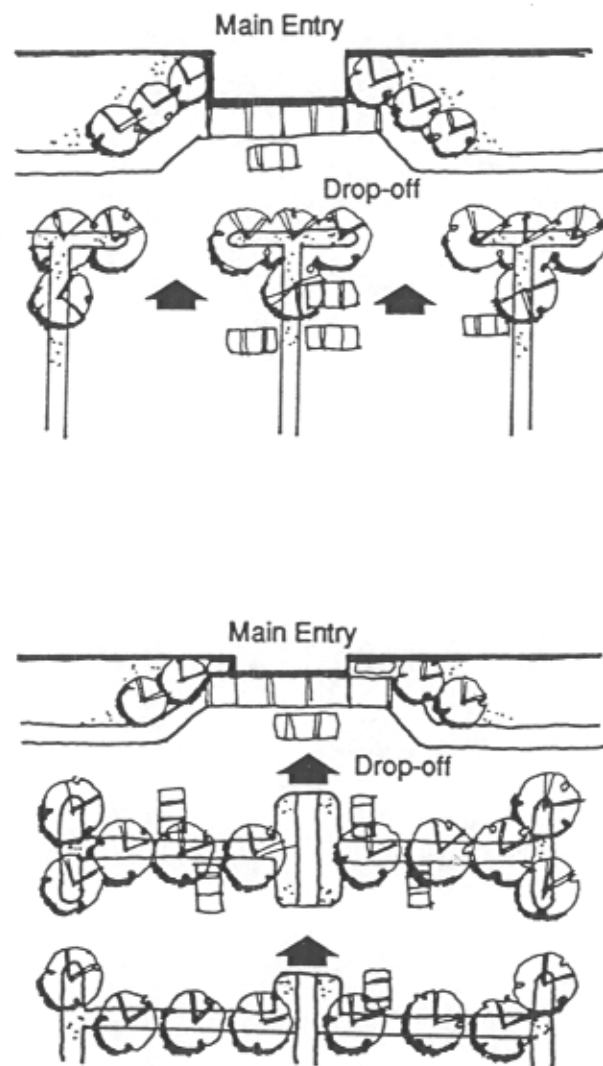


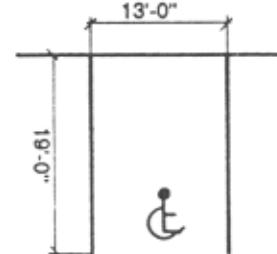
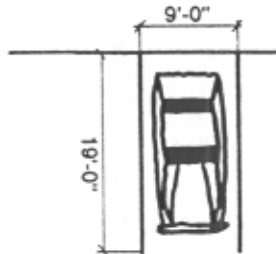
Figure 3-21: Pedestrian Circulation

Off-Street Parking

Perpendicular (90-degree) parking is standard for parking areas having two-way traffic in the aisles, and is the preferred parking layout. Minimum dimensions for 90-degree, off-street parking are illustrated in the graphic (see Figure 3-22).

Angle parking (45- or 60-degree) is standard for parking areas with one-way traffic. It provides easier turning into and out of parking stalls. Angle parking gives better car/stall visibility from the aisle and safer access to the car trunk. Minimum dimensions for 45- and 60-degree, off-street parking are illustrated in the graphic (see Figure 3-23).

90° Parking

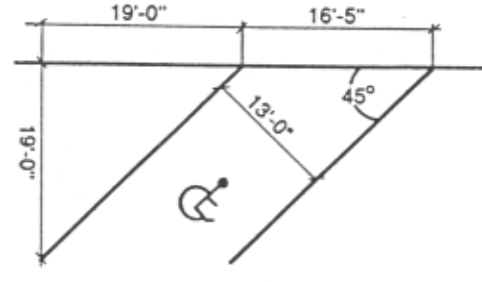
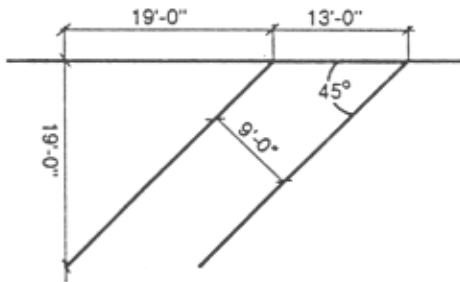


Handicap Parking

Lettering and Markings Centered in Stall.
4" Solid White Line.

Figure 3-23: Perpendicular Parking

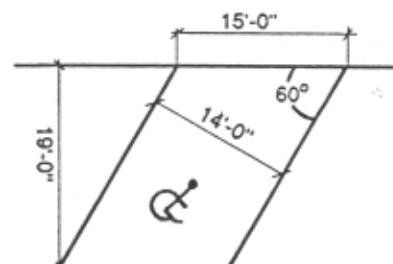
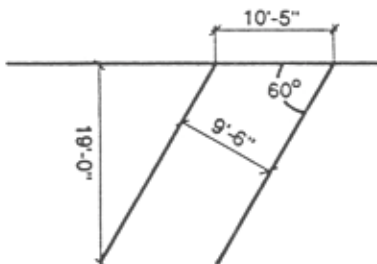
45° Parking



Handicap Parking

Lettering and Markings Centered in Stall. 4" Solid White Line.

60° Parking



Handicap Parking

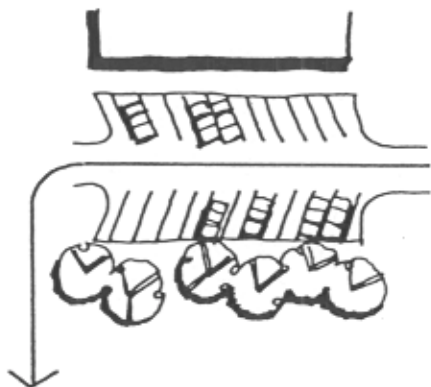
Lettering and Markings Centered in Stall. 4" Solid White Line.

Figure 3-22: Angle Parking

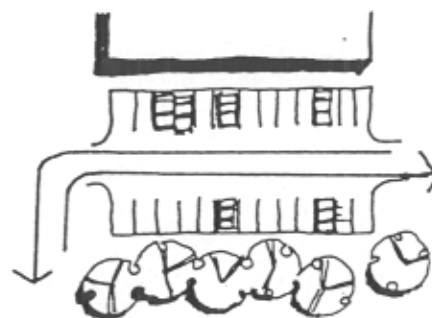
DESIGN GUIDELINES

Parking

The following examples portray typical parking situations illustrating the preferred parking layout. (see Figure 3-24).

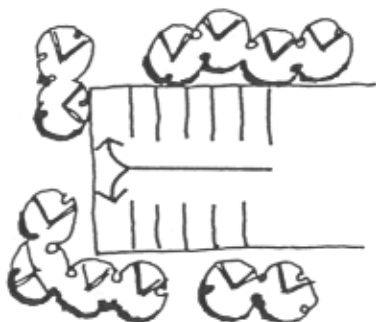


Situation: One-Way Access through Court.
Layout: Angle Parking Preferred.

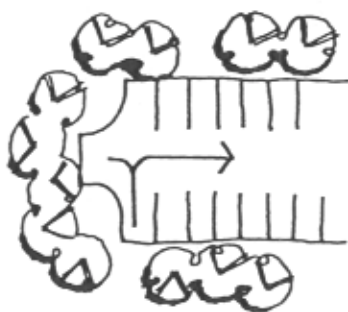


Situation: Two-Way Access.
Layout: Perpendicular Parking is Required
for Stall Access on Both Sides.

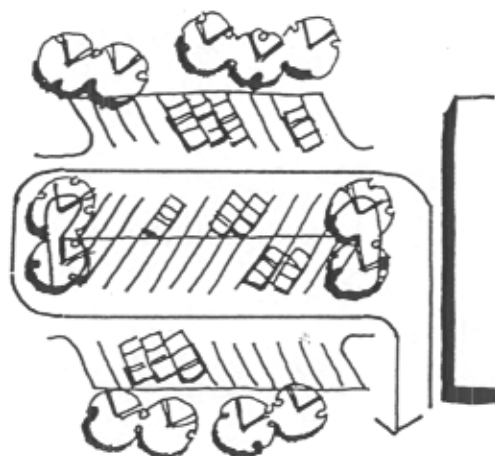
Poor



Preferred



Situation: Dead-End Courts must be Avoided.
Layout: Where the Aisle Lanes cannot be Looped,
a Reserved Turning Space is Needed
to Prevent the Trapping of Vehicles.



Situation: One-Way Traffic through
Two-Court Compound.
Layout: Angle Parking Preferred.

Figure 3-24: Typical Parking Situations

Setbacks

A setback must be established wherever possible between a building and parking lot. Ideally, the minimum setback for parking lots shall be 20 feet for a building of three stories or greater, 15 feet for a two-story building, and 10 feet for a one-story building. These must be reflected in all new construction and in any renovations. It is recommended that existing lots also be realigned to conform to this standard (see Figure 3-25).

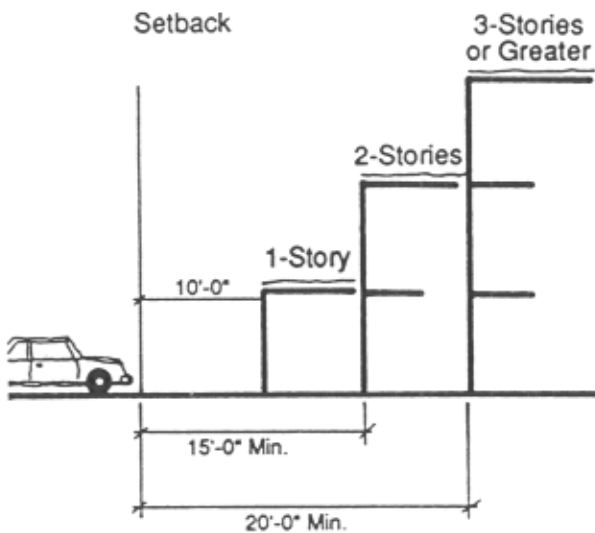


Figure 3-25: Setback Standards

A setback must also be established between the parking lot and street. A minimum setback of 6 to 8 feet shall be maintained. The parking lot and street must be visually separated through one of the following methods (see Figure 3-26).

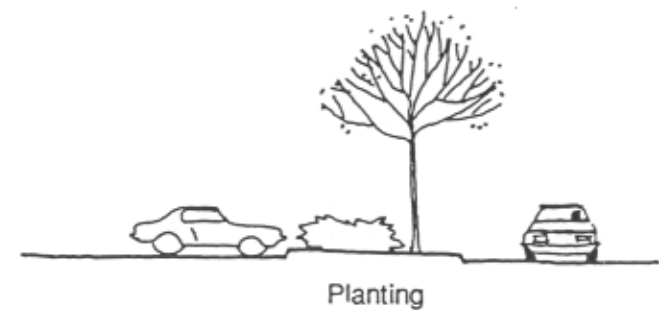


Figure 3-26: Separation of Parking Lot and Road

DESIGN GUIDELINES

Parking

On-Street Parking

On-street parking is permitted on secondary and tertiary streets in areas where off-street parking is not feasible. The streets should be low-speed, low-volume trafficways. Parallel or curb-side parking is permissible.

Pull-in or angle parking is to be discouraged because it poses a safety hazard and tends to give the view of the street as an extended parking lot.

Landscaping

An essential component in the design of parking lots is the integration of landscape materials. Existing lots, when renovated or repaired, must incorporate these principles that apply to new lots.

Plant Materials

Specific plants to be used in and around a parking lot must be chosen with care. Trees in these paved areas must be able to withstand harsher conditions than lawn trees because of the heat radiating from paved surfaces and a reduced water supply. Trees shall not produce excessive litter, flowers, fruits, nuts, or leaves and must not cause a hazard to vehicles or pedestrians.

Shrubs must not grow too large, thus becoming a maintenance problem.

Groundcovers must be able to withstand occasional foot traffic, and turf must be able to withstand a great deal of foot traffic.

Refer to the Plant Materials Palette (Tables 3-2 to 3-8, pages 3-? to 3-?) for information on appropriate plant materials for parking lots.

Planting Islands

Planting islands are important because they integrate the parking lot into the landscape. In addition, they provide a source of shade for parking lots as well as an area of drainage within the paved lot. Planting islands should occur at least once every 12 spaces. All planting islands in parking lots shall contain shade trees (see Figure 3-27).

Planting islands shall also be placed around any existing trees to preserve them. Curbs around islands shall be sufficiently

deep into the ground so that water draining through the island does not erode the subsurface of the parking lot.

In existing parking lots or in any area where there is not sufficient space for a planting strip, trees shall be planted in the pavement with tree grates around to protect the trunk. Grates shall be sized so a minimum space of 3" is maintained between the trunk of the tree and the grate. As the tree grows, sections of the grate should be removed to retain the minimum 3" spacing.

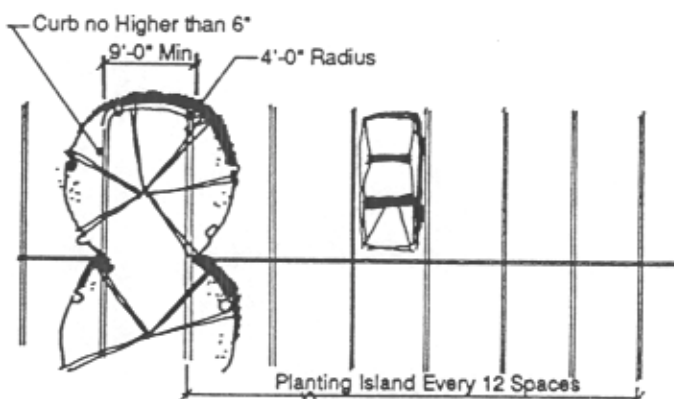


Figure 3-27: Planting Islands

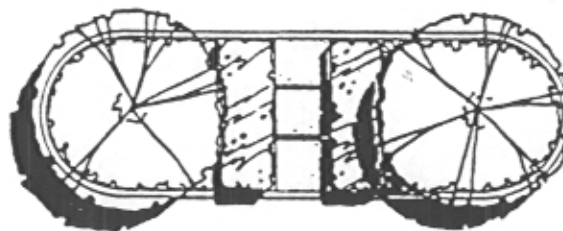


Figure 3-28: Typical Planting Island With Pathway

Trees are to be used where shade is desirable and space allows. Trees require at least a 4' width to allow room for proper planting of the root ball; more space is desirable and sometimes necessary. Shrubs are to be used for screening and control of pedestrian traffic. They may be used only when there is sufficient room to allow them to fill out naturally. Groundcovers, due to low maintenance requirements, are an excellent choice to use in vehicle overhang areas where pedestrian traffic is not heavy.

If pedestrian traffic crosses the planting island, the design should provide for a barrier to direct people around the island or a defined pathway through the island (see Figure 3-28)

Parking Lot Entries

It may sometimes be appropriate to use additional landscaping to accent parking lot entries. Landscape materials must not block vehicular sightlines at entries and exits (see Figure 3-29)

Planting Buffers or Screens

Parking lots should be screened from view in high visibility areas to reduce the impact of large areas of asphalt. Apply the principles illustrated in the following graphics to parking lots at Fort Detrick (see Figure 3-30).

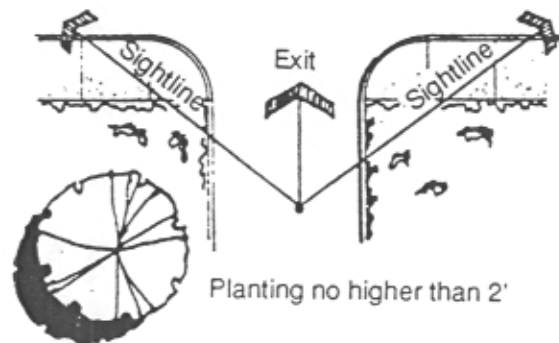


Figure 3-29: Entries and Sight lines

DESIGN GUIDELINES

Parking

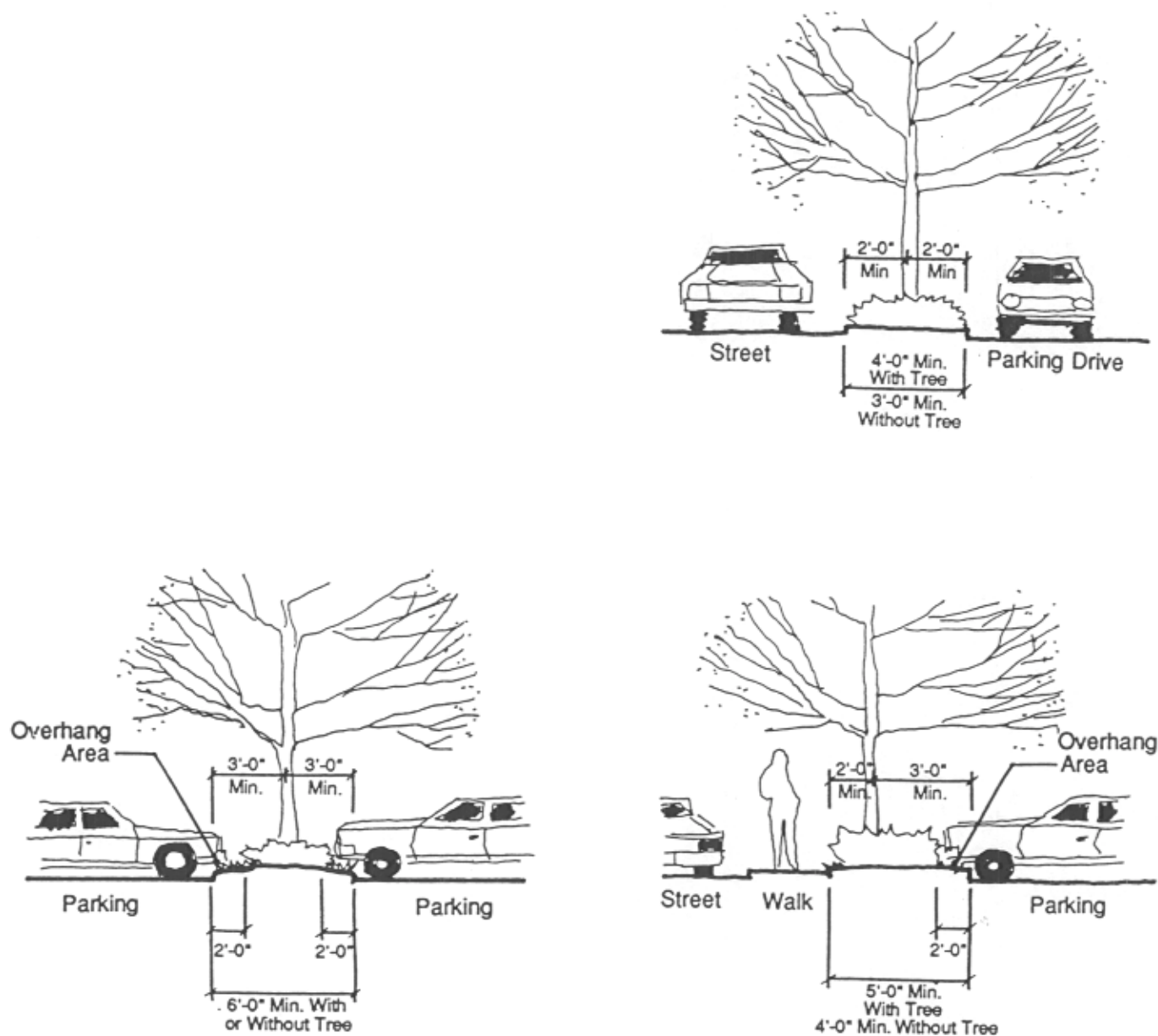


Figure 3-30: Planting Buffers and Screens

Loading Docks and Service Areas

The following criteria have been established to ensure that the design of loading docks and service areas is functional and aesthetically pleasing (see Figure 3-31).

- Segregate service traffic.
- Loading docks and service areas shall be screened from adjacent streets and high-use areas.
- Loading docks and service areas shall be designed as an integral part of the building.
- Loading docks and service areas shall be designed so that the entire servicing operation is conducted within the confines of the building site.
- Loading docks and service areas shall only be permitted on the side or rear of the building and shall be designed not to interfere with movement of traffic within the site.

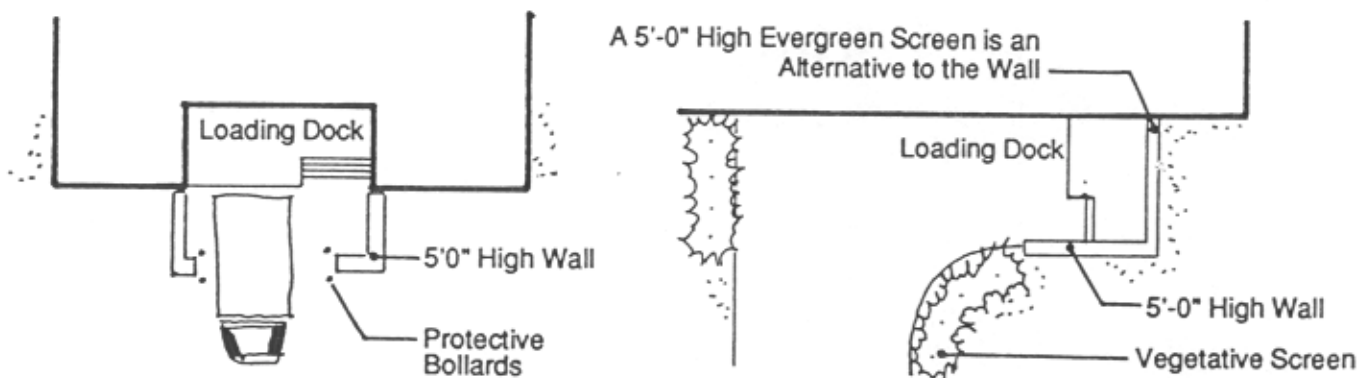


Figure 3-31: Screening of Loading Docks and Service Areas

ROADS

General Principles

The overall goals for improving the visual environment of the street system include:

- Implement the primary road system as outlined in the *Master Plan*. Designate Doughten Drive, Porter Street, and Ditto Avenue as primary streets that will have a minimum of curb cuts, sidewalks, street tree plantings, standard width, and prohibition of on-street parking. These streets will connect major destination points. In addition, extend Doughten Avenue to form a loop road (see Figure 3-155).
- Correct road alignments so that all roads intersect at 90-degree angles.
- Redesignate drives that are not through streets, such as an entrance to a parking lot or to the storage area of a building, so that they do not appear as streets.

Establish a clear separation between roads and parking.

- Reinforce the hierarchy of trafficways by a clear differentiation between primary, secondary, and tertiary circulation through the development of appropriate streetscapes; these should include street trees, directional signage, site furnishings, and lighting.

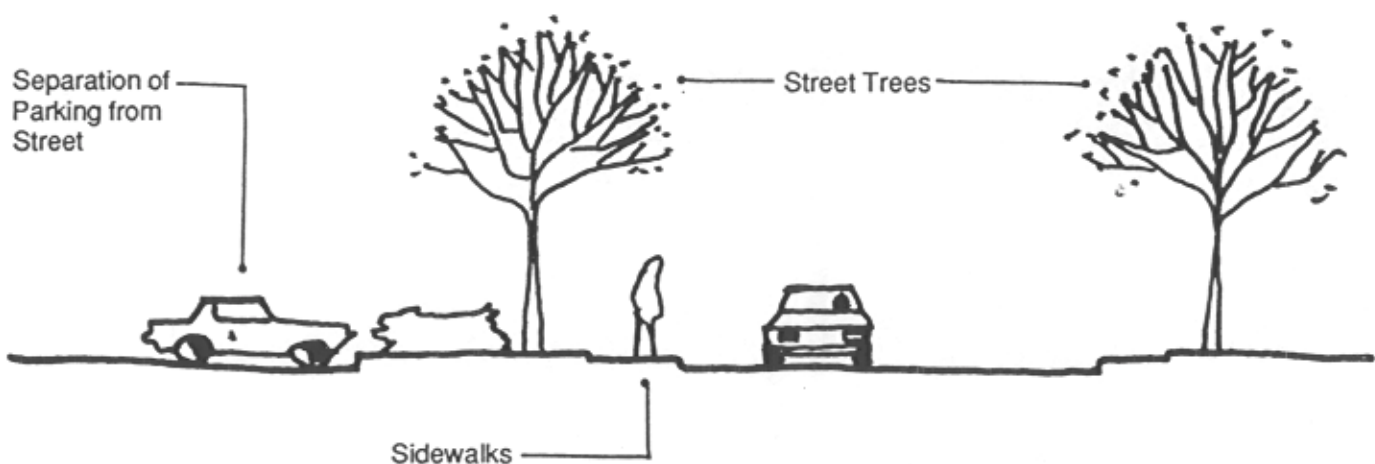


Figure 3-15: Primary Road Streetscape

DESIGN GUIDELINES

Roads

Hierarchy

Loop Road

A prime factor in auto safety and initial comprehension of Fort Detrick's layout is its hierarchy of circulation. The *Master Plan* provided the backbone for this by proposing a major loop road. This configuration of the Doughten Drive will improve traffic safety and Fort Detrick's image in many ways. It forms a boundary between Detrick and the NCI area and frames the core of activity rather than bisecting it. The smooth alignment avoids the problem that Ditto Avenue has with its dangerous skewed intersections in heavy traffic areas. The configuration and location of this road is not strong enough in itself to clearly identify it as the major collector (see Figure 3-16).



Figure 3-16: Loop Road

Primary

Primary streets, designated by the *Master Plan*, include Porter Street, Doughten Drive, and Ditto Avenue. All on-street parking should be removed from the major loop road, Doughten Drive, and the other primary streets, Porter Street and Ditto Avenue. These streets must have a minimum of curb cuts. These roads should be widened to 30 feet to differentiate them from minor streets. Strong sight lines need to be developed that reinforce the traffic direction by focusing on the road and destination. This can be done with plantings, landform, placement of building masses as a screen, and placement of roadside amenities.

To strengthen their identity, the site line of primary streets should be continuous. Doughten Drive currently ends in the parking court of a family housing complex to the north and in several parking lots to the south. Porter Street ends in the facilities engineering building, with associated parking on the west. Ditto Avenue ends abruptly with a chain-link fence placed across the road north of the USDA zone. These problems can be alleviated through screening and realignment.

See the *Fort Detrick Project Documentation* document for more information on Doughten Drive.

Secondary and Tertiary

Secondary streets, designated by the *Master Plan*, are Beasley Drive, Boyles Street, Bullene Drive, Chandler Street, Miller Drive, Randall Street, Scheider Street, Stark Street, Sultan Street, and Ware Drive. All other paved roads are designated as tertiary streets by the *Master Plan*. To complete the hierarchy, secondary and tertiary roads should be designed for slower traffic and, when appropriate, identified for a specific use such as service entrances. Traffic will be slowed down on tertiary roads by using cul-de-sacs, loop configurations, or a meandering alignment where feasible. Existing pseudo road/parking lots occurring in older areas need visual or physical separation to avoid confusion. Roads should have clearly defined direction and a definite termination or destination. Fraim and Palacky Streets have the greatest problems of this type. Fraim Street is not a street at all but a driveway to several parking lots that spill into each other. The name should be removed to deter people from using it as a through street.

Naming

Hierarchy and orientation also need to be identified by street titles that describe the type of road. The titles for streets in the Family Housing Zone are the only ones consistent in application and indicative of the type of road to expect. Identifying a road's importance and orientation will enable a driver to visualize his/her location on the post. Road hierarchy should be differentiated by labeling:

- Tertiary roads as place, circle, or road.
- East-west secondary and primary roads as streets.
- North-south secondary and primary roads as avenues.
- A continuous through street should never have two different names.

Radii

To provide safe and adequate turning room, the following standards shall be implemented for intersection curb line radii:

- Primary Road: 40 feet.
- Secondary Road: 30 feet.
- Tertiary Road: 25 Feet.
- Parking lot entrance: 20 feet.

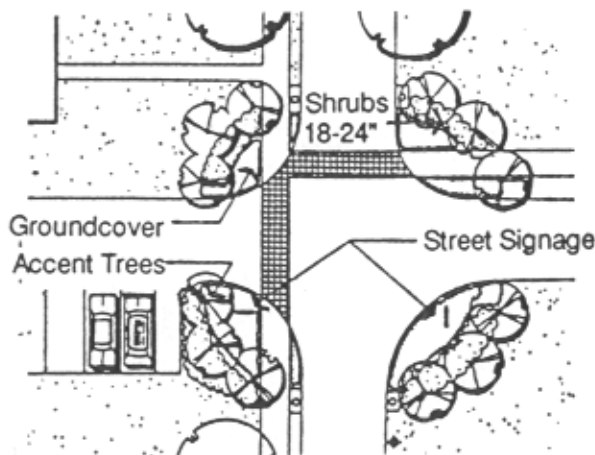


Figure 3-17: Typical Node Planting

Slopes

- All roads must be graded with a crown or high point in the center. This is generally the preferred method of drainage used in conjunction with curb and gutter.
- A road without curb and gutter will generally be drained by a gentle, cross-slope that follows the lay of the land.
- Each drainage method must have a minimum 1 percent slope for positive drainage.

Intersections

- Intersections are the most crucial element in any circulation system. Proper alignment, sight distances, crosswalks, and proper signage help to reduce accidents and improve circulation.
- The angle at which roads intersect is very important for safety. Roads must cross at right angles (90 degrees). This standard must be used when designing new roads and to realign existing intersections that do not conform to these standards.
- Sight distance is important when crossing an intersection or entering a road.
- A driver must have unobstructed views in the direction of all oncoming traffic. The location at which the driver is waiting to cross or enter a traffic lane, to a point 75 feet down the centerline, to the right and left, forms the sight triangle. The driver's sight triangle must be kept free of tree trunks, mailboxes, shrubs, utility poles, and any other site obstructions.
- High visibility, important intersections are known as nodes. Due to their high visibility, nodes are to receive special landscape treatment (see Figure 3-17). Street tree spacing may be interrupted at nodes and special accent or flowering trees and shrubs are to be planted to emphasize the intersection. Besides additional landscaping, nodes provide an ideal location for directional signage. These intersections occasionally provide a space to display monuments. Planting may function as a backdrop for such displays. In all cases, vehicular and pedestrian safety is the primary concern; landscaping is not to block crucial sight lines.

DESIGN GUIDELINES

Roads

Paving Materials

- Road pavement shall be asphalt, used in conjunction with cast-in-place concrete curbs and gutters. Repaving asphalt over the concrete gutter is not permitted (see Figures 3-18 and 3-19).
- In parking lots, either a cast-in-place curb or a cast-in-place curb and gutter unit can be used.
- Along roads in naturalized areas, a gravel shoulder is permissible. These roads must have few intersections and, if development occurs, a curb and gutter shall be installed.

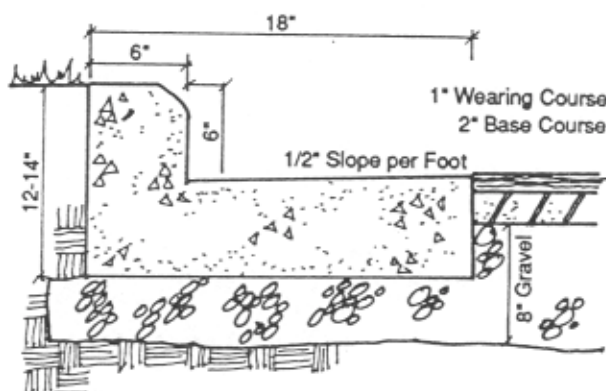


Figure 3-18: Curb and Gutter Detail

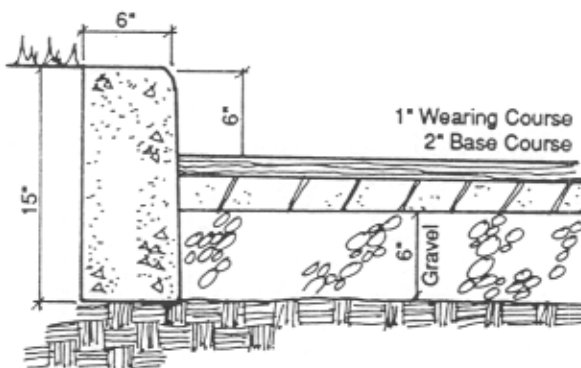


Figure 3-19: Curb Detail

ARCHITECTURE

Guidelines

The development of an open campus atmosphere supportive to scientific research should be conveyed in the architecture on base. The nearby historic downtown of Frederick should also serve as a valuable influence in establishing a theme for development at Fort Detrick. The following are the overall goals for the architectural treatment of existing and new buildings at Fort Detrick.

- Establish a uniform, recognizable palette of materials and colors for buildings.
- Establish guidelines for siting new structures in relation to vehicular and pedestrian circulation as well as to environmental and visual factors.
- Establish guidelines for restoration and adaptive reuse of existing structures.

Enhance the identification of and access to buildings.

This section is intended to give an overview of design policy for application throughout Fort Detrick, in order to provide a common, unifying sense of consistency of materials and design elements. The design guidelines are based on the historic Federal style of the Frederick area, which can be seen most clearly at Fort Detrick on the Nallin Farm. The Federal style is characterized by plain massing, regular fenestration, emphasis of entries, and a vertical emphasis (see Figure 3-2).

These design guidelines are primarily intended for use with nonresidential construction. Specific design practices for residential construction are, however, similar in intent, and are discussed in the family housing zone design section.

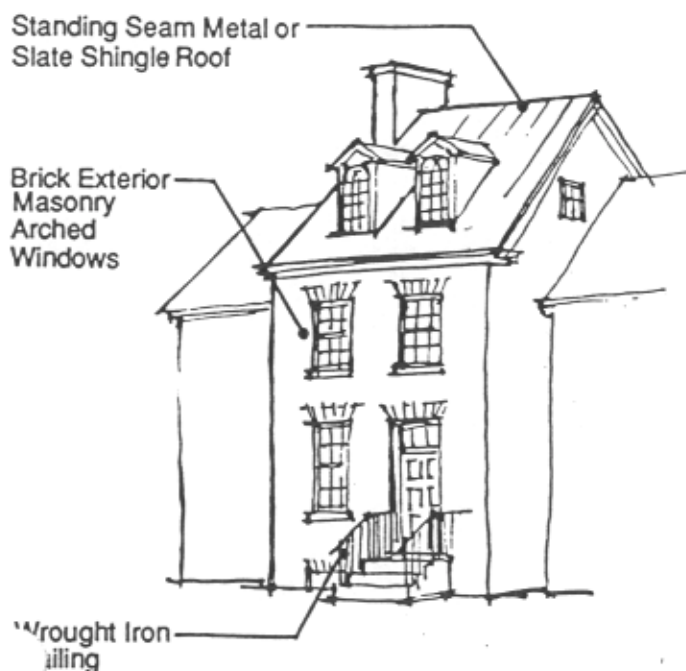


Figure 3-2: Federal Style Building

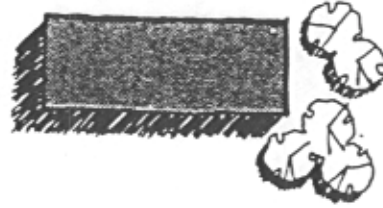
DESIGN GUIDELINES

Architecture

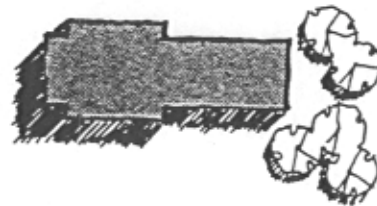
Massing

- Building massing has been addressed in each of the zone design guideline sections. In general, buildings shall be relatively low and horizontal, with balancing vertical emphasis given through the arrangement of fenestration.
- Unusually large or massive buildings should be broken into smaller visual elements that are compatible with the existing scale of Fort Detrick.
- Massing takes on particular importance with additions to existing buildings. Any addition should be clearly subordinate to the existing building unless the addition is as large or larger than the existing building. In any case, an addition should not be made to appear as a simple continuation of the existing building; a combination of set-backs, changes in roof level and orientation, and the use of joining hyphens should be used to set the new apart from the existing in an orderly, purposeful manner (see Figures 3-3 and 3-4).

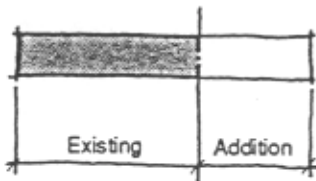
Poor Massing



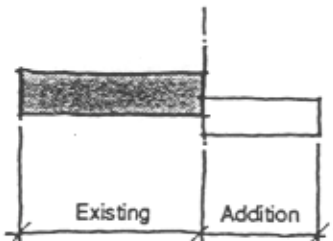
Preferred Massing



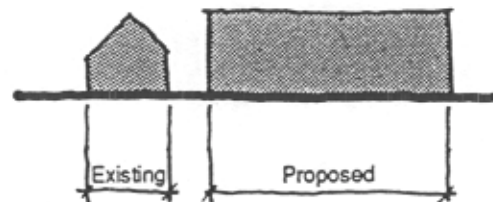
Poor



Preferred



Poor Massing



Preferred Massing

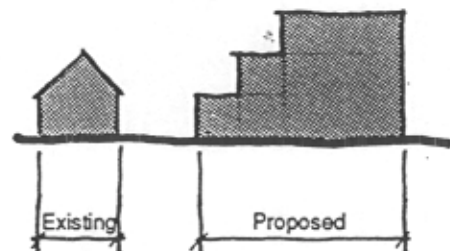


Figure 3-3: Massing of Additions

Figure 3-4: Massing

Windows

- Windows in new construction shall be punched openings, square or vertical in emphasis. Horizontal windows or ribbon windows shall be used only in additions where it is appropriate to match an existing installation.
- Muntins (window subdivisions) shall be used only for residential installations or where they are required to match existing construction.
- Facades shall show a hierarchy of window proportion, drawing distinctions between base, body, and attic sections of the facade (see Figure 3-5).
- Windows in base and attic sections shall be less vertical in emphasis than those in the body of the facade.
- Window frames shall be metal in nonresidential applications. Frame colors shall be contrasting enamel finishes or bronze anodized aluminum. Dark bronze finishes shall not be used with heavily tinted glazing in order to avoid a loss of contrast between windows and their frame. Window frames shall be distinct from their glazing and the surrounding wall.

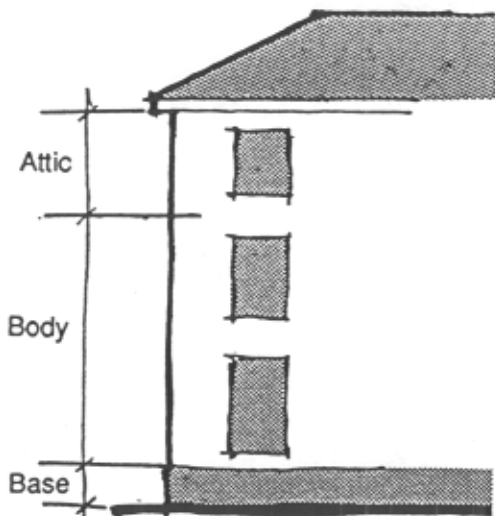


Figure 3-5: Window Proportions

- Mirrored glazing shall not be used, nor shall deeply tinted glazing be used. Such requirements do not preclude the use of moderate tints or low-emissivity coatings to mitigate solar radiation or to improve thermal performance.
- All new glazing shall be thermal glazing, with insulating airspaces and thermal breaks.
- Where windows are inappropriate because of functional requirements, blind openings recessed into the facade shall be employed to maintain a sense of rhythm and scale. Such blind openings shall be regular in character, and shall not be used as simple substitutes for windows where glazed openings are inconvenient. Consideration shall be given to the use of opaque, insulated spandrel glass where the appearance of glazing is desired.
- The use of glass as an overall building cladding shall be discouraged. Where glazing is used for large areas of a facade, the emphasis shall remain on masonry as the basis and prime constituent of the building envelope.

Doors

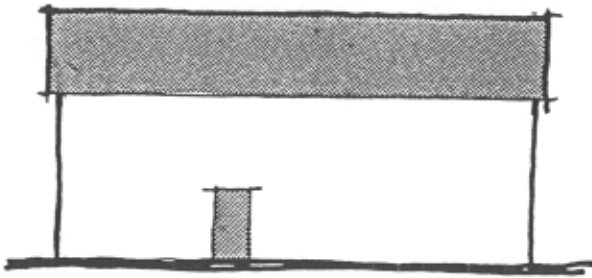
- Main entry doors shall be located so that they are immediately apparent to visitors and convenient to parking and pedestrian access. Such entries shall be accorded prominence by the building design (see Figure 3-6).
- Additional entries shall be provided as they are required by area of functional requirements. Efforts shall be made to avoid the use of service areas, emergency exits, and back doors as primary entries for employees.
- Secondary entries for employees shall be accorded appropriate prominence without causing confusion about the location of the primary entrance.
- Heavily used doors shall incorporate glazing to allow the observation of oncoming traffic.

DESIGN GUIDELINES

Architecture

- Door and frame colors shall coordinate with window frames.
- All heavily used entries, including primary, secondary and service entries shall provide some form of weather protection.

Poor



Preferred

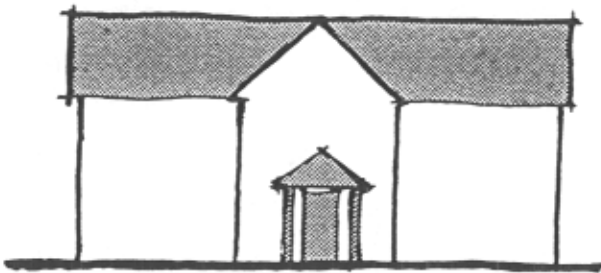


Figure 3-6: Main Entry Doors

Roofs

- The use of pitched roofing shall be encouraged wherever possible, as such forms are key factors in unifying the installation into a scientific campus. Where it is practical to provide a pitched roof, the pitch should be more than 4 in 12, up to a maximum of 12 in 12.
- Materials shall be painted or coated standing seam metal for large or prominent installations, and medium-to-dark gray fiberglass-asphalt shingles for lesser installations. Asphalt shingles, where used, shall be heavy-duty.

- Wood shakes or imitation asphalt shakes shall not be used, nor shall white, black, brown, green, red, etc., asphalt shingles be used.
- Slate roofing shall be encouraged for prominent buildings where metal roofing is not desired.
- "Mansard" (tilted-fascia) roofs shall not be used in any circumstances.
- In cases where a high parapet line is desired for aesthetic reasons or for hiding roof-mounted equipment, a properly articulated parapet shall be provided.
- Where it is not practical to provide a pitched roof for the entire building, a section of pitched roof may conceal a flat well or platform, as is the case at Building 810.
- For large buildings where a pitched roof is inappropriate, a well-articulated parapet shall be provided, and a pitched roof may be used to accent the entry or special building elements. It is, however, the intention of the design guidelines that the "stage-front" effect, so often seen at commercial shopping centers in the 1980s, should be avoided, and that pitched roofs shall be employed only where they are consistent with the design logic of the building, and not for their own sake.

Materials

- The basic material used for all new construction at Fort Detrick shall be medium-to-dark red brick, similar to that employed for Building 810. See Table 3-1 for listings of appropriate materials. This shall comprise the body of any significant new building.
- Articulation may be achieved through the use of contrasting forms and materials.
- Mortar shall be colored to achieve a warm buff or reddish color.

in any re-pointing work. Select brick to match color and hardness of the original for repairs to masonry walls. Use mild detergents in lieu of acid solutions for masonry cleaning.

- Avoid complete re-facing of historic structures with siding. Instead, siding should be repaired or replaced with material to match.

Summary

The use of the general design guidelines, along with the specific information found in the visual zone guidelines, will yield a consistent design theme consistent with the image of a

scientific research campus. At the same time, the link between Fort Detrick and the historic city of Frederick will grow stronger as the contrast between them is reduced through the use of a common design language.

New Building Prototypes

New building prototypes have been developed for a masonry laboratory building, masonry industrial building, administrative and support building (small, intermediate, and large), large operations building, residential duplex unit, and residential four-unit apartment. See Figures 3-7 to 3-14 for information on these prototypes.



Figure 3-7: Masonry Laboratory Building Prototype

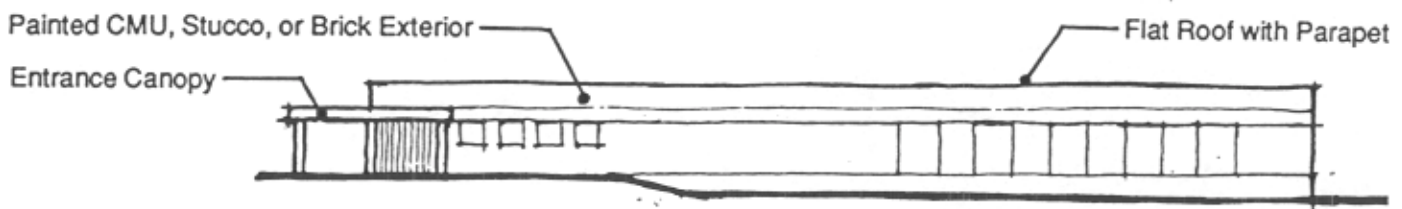


Figure 3-8: Masonry Industrial Building Prototype

DESIGN GUIDELINES

Architecture



Figure 3-9: Small Administration and Support Building Prototype

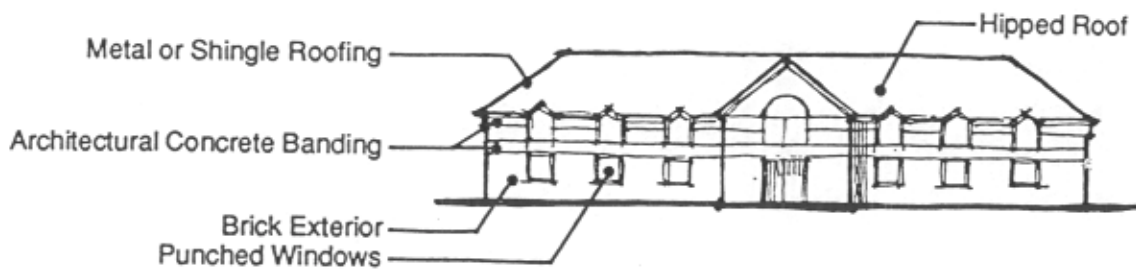


Figure 3-10: Intermediate Administration and Support Building Prototype

- The use of stark white mortar shall be avoided.
- For industrial and utility buildings, brick cladding may not be an economical choice for the primary building material. In such cases, an appropriately colored textured concrete block material may be used, or a synthetic stucco material such as Dryvit. Metal siding may be considered for such buildings where a solid visual base is provided by masonry materials.
- Metal siding shall not be used as the sole exterior material unless the building is concealed from the street by plantings or other buildings, or unless the building is small and of a temporary nature.
- The only other exception to this rule may be found in the immediate vicinity of the 1110th Signal Battalion Zone's satellite antennas, where a more substantial building would compete with the antennas for visual dominance.
- A few existing temporary and semipermanent buildings use wood as a primary exterior material. Where such buildings exist they shall be maintained according to the color matrix until they are replaced with permanent structures.
- Wood in new exterior construction will only be employed in small structures such as picnic shelters and in the family housing zones.
- In new and existing structures, all pressure-treated wood shall be stained or painted as soon as it has weathered enough to accept a coating, usually six to eight months after installation.
- Pressure-treated wood structures such as decks, porches, ramps, etc., shall be detailed carefully and completely to avoid the raw, temporary look that such structures frequently have.
- The use of wood lattice shall be confined to foundation screening on nonresidential buildings.
- Residential structures may use wood lattice to screen service areas, porches, or foundations, provided such screens are detailed with the same care and permanence as the parent structure.

Articulation

- Articulation is necessary to give a building scale, rhythm and visual interest. This can be provided either through the use of formal elements such as pilasters or belt courses, textural elements such as bond patterns and courses, or contrasting colors and materials.
- Subtle textures may be introduced through the use of header or soldier courses.
- Bonding patterns may be simulated through the use of headers in a regular pattern.
- Stronger emphasis may be made by casting shadow patterns with projecting belt courses, recessed reveals, cornices, or pilasters.
- Emphasis may also be made with the use of contrasting courses or patterns of different-colored brick. Precast concrete or cast stone provide alternatives for expressing design elements in a brick composition.
- Since Fort Detrick has a tradition of simple, plain design, any articulation or elaboration of the basic design of a building should be kept as simple and unobtrusive as possible. Elaborate patterns or formal statements are to be avoided, and the design emphasis should remain with the basic form and massing of the building.
- Buildings clad with synthetic stucco may be articulated through similar means, using reveals, control joint patterns, and contrasting panels.

Colors

- The use of color for existing buildings will be governed by the materials and colors palette found in Table 3-1.
- All landscape items, such as dumpsters, electric transformers, telephone cabinets, etc., shall be painted a dark bronze color (to match *Spraylat* 20-313 Duranodic) to ensure that these items are uniform in color and do not detract from their surroundings.

DESIGN GUIDELINES

Architecture

Residential

- New construction shall draw upon the Federal style of the local Frederick area for massing, materials, and scale.
- Emphasis shall be on permanent, durable, building materials, with red brick dominating.
- Brick shall be medium-to-dark red, using standard sizing. Oversized or unusually proportioned brick shall not be used.
- Windows shall be vertical in emphasis, with low sills and high heads. Where ceiling heights allow, window heads shall align with transoms over exterior doors. Window sashes shall be either undivided, or shall have grid-pattern muntins. The use of diamond-pattern muntins shall not be permitted.
- Exterior doors shall be paneled wood or insulated steel units. Storm doors, if they are present, shall have their major members in alignment with the major members of the primary doors.
- Mechanical equipment shall be located away from building entrances, and shall be screened by landscaping or low brick walls. Service areas shall be similarly screened.
- Primary roofs shall be sloped in excess of 6 in 12 pitch, up to 12 in 12. Roofs shall be covered with medium-to-dark gray shingles. Low-slope roofs shall be permissible only for shallow applications, such as entry porches.
- Individual units shall be provided with gables or projecting bays to distinguish individual units and provide a sense of rhythm and articulation to groups of units.
- No more than four units shall be arranged together.

Additions

- As stated above, additions to existing buildings shall respect the form, rhythm, scale, and materials of the parent building, while they remain distinct from the existing construction.
- In many cases it will not be possible to match brick colors exactly. In such cases a near-match will give the

impression that one has tried to match the existing color, but failed. Therefore, it may be best to obtain a shade of brick that is in the same color range as the original, but is distinctly darker or lighter than the original. Wildly contrasting colors shall be avoided, such as exist at Building 1422.

- Additions should be set back, with roof lines stepped down to retain the dominance of the original structure.
- The original building fabric, especially in historic structures, should be retained where possible.
- Retain window and door openings and avoid patchwork facades where existing door or window openings have been infilled with brick or panels.
- On historic structures, avoid complete facing of existing materials. Identify and retain existing historically significant details and use materials that match existing ones when possible.
- Identify entrances by the addition of architectural features such as canopies or widened doorways in conjunction with landscape treatment, signage, and lighting.

Historic Structures

- Consider adaptive re-use of existing historic structures. Uses must be compatible with the structure and not require extensive demolition and renovation.
- The *Final Report, Historic Preservation Plan, Fort Detrick Maryland (1988)* should be consulted when considering changes to historic structures.
- Additions to historic structures should respect the style and massing of the existing structure.
- Retain the original building fabric where possible. Window and door openings should be retained where possible and the infill of these openings when required should be recessed to preserve their identity.
- Identify and retain existing historically significant details in any restoration work.
- Observe the guidelines of the National Park Service in the restoration of any masonry work. Use mortar designs compatible in color and texture with existing mortar types



Figure 3-11: Large Administration and Support Building Prototype

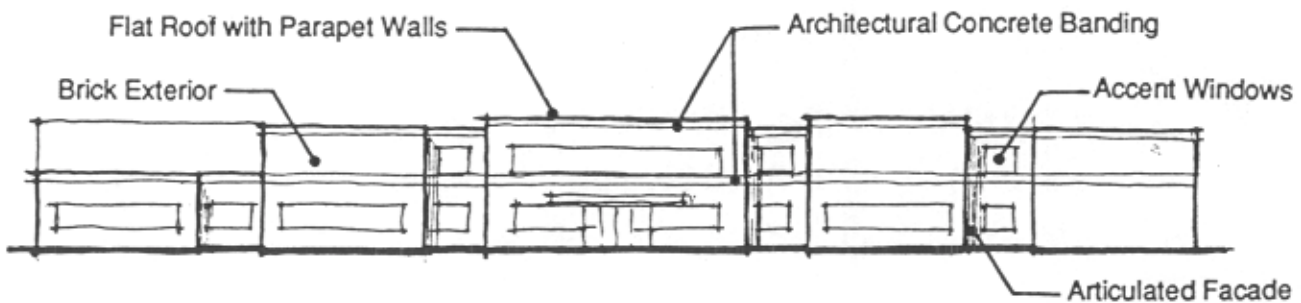


Figure 3-12: Large Operations Building Prototype

DESIGN GUIDELINES

Architecture

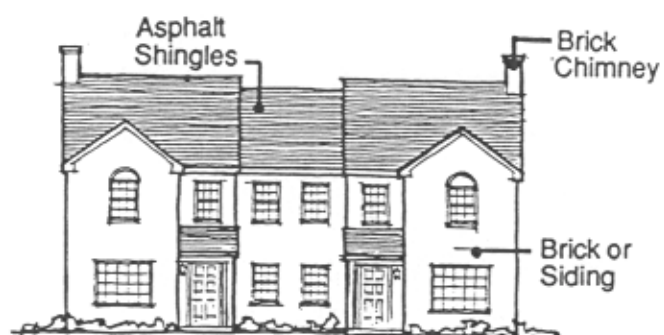


Figure 3-13: Residential Duplex Prototype



Figure 3-14: Residential Four-Unit Apartment Prototype

Existing Building Types

The following are descriptions of the existing building types. Consult Table 3-1 for information on appropriate materials and colors for these building types.

Type A

Semi-Permanent Concrete Block Buildings

Type A buildings are characterized by the use of formed, bevelled concrete blocks for the exterior walls, with pitched, asphalt-shingle roofs. Trim and gables are usually of wood construction. These buildings are typically one- or two-stories high, with large, steel sash windows. The overall style of these buildings is reminiscent of Frederick county farm utility buildings from the 1930s and 1940s.

Type B

Temporary Frame Barracks

Type B buildings are gradually vanishing from Fort Detrick, as they have exceeded their intended lifespan by as much as forty years. These buildings are light one- and two-story frame buildings with pitched roofs. These were originally clad with wood clapboards that have given way to asbestos shingles and aluminum siding. Windows are typically double-hung wood units.

Type C

Temporary Utility Buildings

Type C buildings are disappearing as well. These buildings are one-story, industrial or service buildings that serve as warehouses, repair shops, and athletic facilities. These buildings have low, pitched roofs and a variety of wood and steel, sash windows. Siding is asbestos composition panels. Nearly all of these buildings are outmoded and in poor condition, and are slated for replacement in the coming years.

Type D

Temporary Modular Units

Type D buildings are mobile, office, trailer units that are set on elevated bases. These units can be joined together to form relatively large buildings, but are temporary in nature and can be removed for the site in a short period of time. Exterior skins are metal panels with sliding, aluminum window. Air conditioning units are mounted on the ends of the individual units.

Type E

Semi-Permanent Community Buildings

Type E buildings have a variety of forms, materials, and functions, but are characterized by one-story construction with pitched roofs and plain facades. These buildings are larger than the temporary barracks that are their contemporaries. All have sloping, asphalt-shingle roofs and may be clad in siding or concrete block with wood trim. Where windows exist, they are typically wood, double-hung units.

Type F

Masonry Laboratory Buildings

Type F buildings are the most typical permanent structures at Fort Detrick. They are characterized by long, symmetrical, two-story facades, pitched roofs, and one or more cross gables facing the street. Windows are simple metal sashes set in regularly spaced, punched openings. Main entrances are centered in the facades. Most Type F buildings are clad in red brick.

Type G

Masonry Process and Industrial Buildings

Type G buildings are contemporary with Type F buildings and share many details; some are connected to Type F buildings. Type G buildings are large and irregular in plan, with flat roofs. The most prominent Type G buildings at Fort Detrick are the six-story pilot plant building, its annexes, and the power plant. FLAIR Armory is different in use but similar in character, form, and materials.

DESIGN GUIDELINES

Architecture

Type H

Animal Facilities

Type H buildings are associated with animal facilities, and are characterized by one-story, masonry construction with deep, roof overhangs shading the front elevations. Most of these buildings have been refinished with a Dryvit stucco system.

Type I

Pre-engineered Metal Utility Buildings

Type I buildings are metal-skinned, pre-engineered buildings, typically used as storage and service facilities. The satellite communications facility service buildings are Type I buildings.

Type J

Pre-engineered Office Buildings

Type J buildings are also pre-engineered buildings, but with masonry veneer finishes for use as offices.

Type K

Large Operations Buildings

Type K buildings are very large, specialized buildings with few windows and precast concrete or masonry exterior finishes. These buildings house sensitive tenants and processes requiring large floor areas and close control of the interior environment. Roofs are flat and building volumes are simply massed.

Type L

Modern Administration and Support Buildings

Type L buildings are recently constructed office, service, and personnel support buildings, and are characterized by pitched roofs, masonry exteriors, and an overall postmodern design influence. This style is being encouraged for future buildings at Fort Detrick.

Type M

Masonry Industrial Buildings

Type M buildings are miscellaneous concrete masonry and structural clay tile industrial buildings. These are usually one or two stories, with few windows, and flat roofs.

Type N

Family Housing

Multiple-unit family housing may be divided into three classes.

Type N-1 Duplex Townhouse Units

These units are grouped in attached pairs, with exteriors of masonry and composition siding.

Type N-2 Attached Wood Frame Townhouse Units

Type N-2 units are arranged in long attached rows. Most of these units have had new aluminum siding applied. Some similar single-family units exist as well.

Type N-3 Attached Masonry Townhouse Units

These units are grouped in long rows with projecting porches.

Type N-4 Frame Duplex Units

These duplex units are grouped in attached pairs, with exteriors of frame siding.

Type O

Historic Buildings

The Nallin Farm buildings comprise this group.

DESIGN GUIDELINES

Architecture

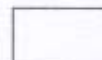
Table 3-1: Building Colors and Materials Palette

		Type A	Type B	Type C	Type D	Type E	Type F	Type G	Type H	Type I	Type J	Type K	Type L	Type M	Type N1	Type N2	Type N3	Type N4	Type O	Water Towers	Oil Tanks	Satellite Antenna	Exposed Piping
Walls	Brick						E	E			E	E	E										
	CMU	P2												P234	E								
	Tile													P234									
	Metal				P14					P3		P2								P23	P24	P12	
	Ash. Plst.			P3																			
	Whl. Plst.																						
Roofs	Lap Siding	P1	P2			P2										P4							
	Shingles								P2				E		E2	P2	P2						
	State	SEE ROOFING NOTE																					
	As Shingles																						
	SW Membr.																						
	Metal										E		E										
Trim/Details	Precast											E	E										
	Wood	P1	P1	P5	P5	P5	P5	P5	P8						P2	P578	P1	E					
	Brick						E	E					E					E					
Sash	Metal						P5	P5	P8	P8	E		E	P68	P5	P578	P578		P78				P23
	Wood	P1	P1	P6		P5																	
	Steel			P6					P8					P68									
Doors	Aluminum				E		E	E		E	E	E	E										
	Wood	P578	P578			P5									P578	P578	P578	E					
	Metal			P6	P5				P8	P8		P4	E	P68									
	Aluminum						E	E		E	E	E	E										

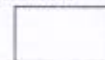
ROOFING NOTE: Existing slate roof installations shall be repaired and maintained. Asphalt shingles shall be medium gray or charcoal gray. Brown and light gray should be avoided. Membrane roof installations white or light gray to reduce heat absorption during the summer.

PANT COLORS

White
P-1

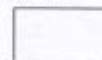


Blue
P-7 Duron 5124-D



Beige

P2 Duron 5381-W

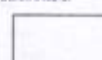


Green

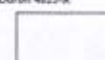
P8 Duron 4804-D



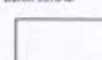
P3 Duron 5482-M



P9 Duron 4825-A



P4 Duron 5373-M

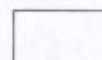


E Existing color to remain

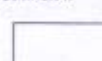
All colors by Duron

Red

P5 Duron 4315-A



P6 Duron 5265-R



ENTRIES

Refer to the appropriate sections of the *Design Guidelines* for more information on signage, lighting, site furnishings, security and utilities for these areas.

Main Entry

The main entry, currently located at the intersection of 7th Avenue and Military Road, is used by the most people. It is the only one that visitors may enter. Its location next to the main administrative area also gives it added prominence. However, its current location contributes to traffic problems within the post and does not visually relate to the administrative area.

As part of the redevelopment of the Military Road Boundary, the Main Gate should be moved to align with Doughnten Drive. This recommendation is based on approved plans from the *Master Plan*. This realignment will decrease the traffic congestion and strengthen the perception of Doughnten Drive as the primary loop road. It also links the entry more directly to the green space along Military Road. See the *Fort Detrick Project Documentation* document for more information.

Rosemont Entry

This entry is used by employees and residents. Currently, there is nothing to denote this as an entry to Fort Detrick. Unfortunately, this entry is affected by the visual problems of the adjacent districts and boundary area. Improving the appearance in these areas will improve the perception of this entry. In addition, the following steps should be taken:

- Provide a gate house that does not have a utilitarian, industrial image.
- Provide signage denoting this as an entry to Fort Detrick.
- Provide appropriate lighting that is a part of a positive visual image at this area and not merely functional.

Opossumtown Pike Entry

At present, not only is there no signage denoting this as an entry to Fort Detrick, this entry also is not visible from the road because of its recessed location between two hills. The location of this gate cannot be changed, but its presence can be denoted. The following steps should be taken:

- Place a sign along the boundary on either side.
- Provide an appropriate gate house.
- Provide pedestrian access at this gate.

See the *Fort Detrick Project Documentation* document for more information.

Area B Entry

The current metal gate is an appropriate entry to Area B. However, a simple, unobtrusive sign is needed to denote this as a part of Fort Detrick.

DESIGN GUIDELINES

Entries

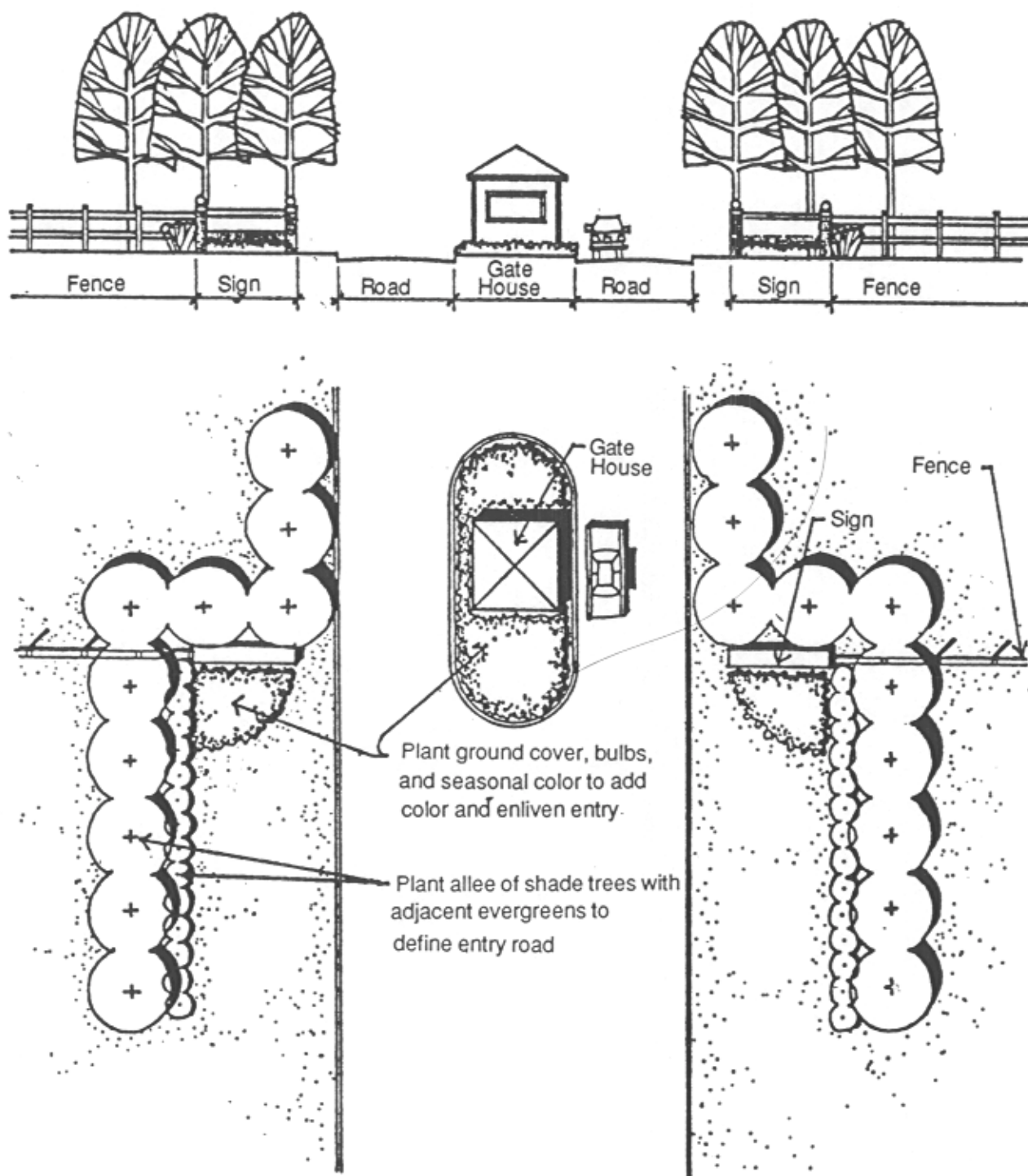


Figure 3-1: Gate Planting Principles

BOUNDARIES

The boundaries are the first and often only contact people have with Fort Detrick. The boundary areas receive the greatest amount of public exposure and it is at this point that the image is portrayed to the surrounding community. The boundaries should visually define Fort Detrick and distinguish it from the surrounding community. Any actions that affect the boundary should keep these ideas in mind.

Refer to the appropriate sections of the *Design Guidelines* for information on signage, lighting, site furnishings, security and utilities for these areas.

Military Road Boundary

This area, located between Military Road and Porter Street, serves as the visual interface between Fort Detrick and the adjacent residential community. This area should be an open, green space that defines the edge of the post and it should be compatible with the houses across the street and the general environment of the area. This area should also be the front yard for the main group of administrative buildings located on the west side of Porter Street. The following steps should be taken to promote the desired green-space effect:

- Remove Buildings 115, 116, 611, 713, 717, 718, and 719.
- Remove all parking and storage facilities.
- Rehabilitate Buildings 10, 11, and 12 to serve as a museum to interpret Fort Detrick's history and current mission to the public.
- Restore Building 201 to its historic appearance. This is a crucial part of the development of this area. This is at a highly visible corner and its restoration not only will improve the appearance of the area, but also will be a link to the post's history. (Refer to page 2-41 for information on Building 201's restoration.)
- Install an appropriate fencing style.
- Plant the area with trees and shrubs. This area should be a public park for the post.

- Incorporate pedestrian paths.
- Realign the Main Entry Gate with Doughten Drive.

The development of the Military Road boundary is a long-term project made up of several phases. Refer to the *Fort Detrick Project Documentation* document for a more detailed description of this project.

Rosemont Avenue Boundary

Most of the industrial activities will remain in this area and there is little room to buffer them. The following steps should be taken:

- Plant a row of trees along the grass strip outside the fence area to lessen the impact of the harsh view within the post at this area, to provide an organizing element to the visual scene, and to define the edge of the post.
- Remove barbed wire from the top of fencing, since this projects an image that is at odds with the current open character of the post. Security should be provided by means that are more visually positive.
- Replace the fence with one that is less industrial in appearance.
- Place utility lines underground wherever possible.
- Shield storage areas from view with fences that are viewed as an extension of the building or with plantings. This will help to minimize the visual impact and lessen the number of confusing elements that are seen in this area.

DESIGN GUIDELINES

Boundaries

Opossumtown Pike Boundary

This boundary presents a pleasant, pastoral scene to passersby. This area should be maintained in its present condition as a farm. However the following should be implemented to strengthen this pleasing view:

- Remove the barbed wire from the fence. Security should be provided by means that are more visually positive. The presence of barbed wire seems incongruous to the farm it is delineating.
- Buffer the view of the parking lot in front of the 1110th Signal Corp Area from direct view along Opossumtown Pike.
- Add an appropriate farm-style gate to the entry drive to the Nallin Farm House. This area is already marked with a double row of trees and a drive. The lack of a gate, even if always locked, is confusing.

Eastern Boundary

This boundary is not sufficiently defined. A tree buffer area is needed to visually buffer the surrounding residential communities and define the edge more clearly. See *Comprehensive Visual Plan* document for more details.

Area B Boundary

The existing fence is an appropriate definition to the boundary edge in Area B. The fencing should have adequate maintenance and the edges should be kept mowed to project a well-cared-for appearance in this area.

DESIGN GUIDELINES MATRIXES

The following matrixes outline the information contained in *Section 3: Design Guidelines*. Numbers within each matrix refer to page numbers containing applicable information. For a description of how to use these matrixes, see page 1-3.

New Buildings Prototypes Matrix

Consult the *New Building Prototypes Matrix* for information concerning the appropriate location for a particular prototypical building.

New Buildings Prototypes Matrix

	Main Administrative Zone	FLAIR Armory Zone	1110th Signal Corps Zone	NCI Zone	USAMRIID Zone	USDA Zone	Personnel Support Zone	Family Housing Zone	Nallin Farm Zone	Industrial Zone	Warehouse Zone
Small Administration and Support Prototype	■	■	■	■	■	■	■				
Intermediate Administration and Support Prototype	■		■	■	■	■					
Large Administration and Support Prototype	■		■	■	■						
Masonry Laboratory Prototype				■	■	■					
Masonry Industrial Prototype										■	■
Operations Prototype				■	■						
Residential Duplex Prototype								■			
Residential 4-Unit Prototype								■			

DESIGN GUIDELINES

Matrix

New Building Matrix

Consult the *New Buildings Matrix* for the location of information on a particular new building prototype.

New Building Matrix

General Information (All Prototypes)	3-17 to 22
Colors and Materials (All Prototypes)	3-21, 22, 29
Small Administration and Support Prototype	3-24
Intermediate Administration and Support Prototype	3-24
Large Administration and Support Prototype	3-25
Masonry Laboratory Prototype	3-23
Masonry Industrial Prototype	3-23
Operations Prototype	3-24
Residential Duplex Prototype	3-22, 26
Residential 4-Unit Apartment Prototype	3-22 26

Existing Buildings Matrix

Consult the *Existing Buildings Matrix* for information concerning all existing structures.

Existing Buildings Matrix

	General Information	Color and Materials
Type A	3-17 to 22, 27	3-29
Type B	3-17 to 22, 27	3-29
Type C	3-17 to 22, 27	3-29
Type D	3-17 to 22, 27	3-29
Type E	3-17 to 22, 27	3-29
Type F	3-17 to 22, 27	3-29
Type G	3-17 to 22, 27	3-29
Type H	3-17 to 22, 28	3-29
Type I	3-17 to 22, 28	3-29
Type J	3-17 to 22, 28	3-29
Type K	3-17 to 22, 28	3-29
Type L	3-17 to 22, 28	3-29
Type M	3-17 to 22, 28	3-29
Type N	3-17 to 22, 28	3-29
Type O	3-17 to 22, 28	3-29
Type N-1	3-17 to 22, 28	3-29
Type N-2	3-17 to 22, 28	3-29
Type N-3	3-17 to 22, 28	3-29
Type N-4	3-17 to 22, 28	3-29
Type O	3-17 to 22, 28	3-29

DESIGN GUIDELINES

Matrix

Roads Matrix

Consult the *Roads Matrix* for information related to vehicular circulation.

Roads Matrix

	All Zones
General Principles	3-31
Hierarchy	3-32 to 33
Radii	3-33
Slopes	3-33
Intersections	3-33
Paving Materials	3-34

Parking Matrix

Consult the *Parking Matrix* for the location of information that relates to parking.

Parking Matrix

	All Zones
General Principles	3-35
Paving Materials	3-35
Handicapped Access	3-35
Parking Lot Locations	3-36
Pedestrian Circulation	3-36
Off-Street Parking	3-37 to 38
Setbacks	3-39
On-Street Parking	3-40
Landscaping	3-40 to 42
Loading Docks and Service Areas	3-43

DESIGN GUIDELINES

Matrix

Pedestrian Circulation Matrix

Consult the *Pedestrian Circulation Matrix* for the location of information related to sidewalks and paths.

Pedestrian Circulation Matrix

	All Zones
General Principles	3-45
Standards and Materials	3-45
Ramps	3-46
Steps	3-46
Crosswalks	3-47

Plazas and Courtyards Matrix

Consult the *Plazas and Courtyards Matrix* for the location of information related to outdoor space at Fort Detrick.

Plazas and Courtyards Matrix

	All Zones
Design Process	3-49
General Principles	3-49 to 50
Scale	3-50
Ground Plane	3-51
Vertical Plane	3-52
Overhead Plane	3-53
Siting Considerations	3-49
General Types	3-50
Paving Materials	3-51

DESIGN GUIDELINES

Matrix

Plant Materials Matrix

Consult the *Plant Materials Matrix* for the location of information regarding all aspects of plant materials at Fort Detrick.

Plant Materials Matrix

	All Zones
General Principles	3-55
Plant Palette	3-55 to 63
Specifications	3-64 to 65
Planting Procedures	3-66 to 67
Plant Protection	3-67 to 3-70
Landscape Considerations	3-70 to 71
Maintenance	3-71 to 73
Pruning	3-74 to 75
Planting Screens	3-76 to 77

Signage Matrix

Consult the *Signage Matrix* for the location of information on the various types of signs at Fort Detrick.

Signage Matrix

	Main Administrative Zone	FLAIR Armory Zone	1110th Signal Corps Zone	NCI Zone	USAMRIID Zone	USDA Zone	Personnel Support Zone	Family Housing Zone	Nallin Farm Zone	Industrial Zone	Warehouse Zone	Area B
General Principles	3-79	3-79	3-79	3-79	3-79	3-79	3-79	3-79	3-79	3-79	3-79	3-79
General Specifications	3-79	3-79	3-79	3-79	3-79	3-79	3-79	NA	NA	3-79	3-79	3-79
Entry Signs	3-80	3-81	3-81	3-81	NA	NA	NA	NA	NA	NA	NA	3-91
Orientation Signs	3-82	3-82	3-82	3-82	3-82	3-82	3-82	NA	3-82	3-82	3-82	3-82
Directional Signs	3-83,84	3-83,84	3-83,84	3-83,84	3-83,84	3-83,84	3-83,84	NA	3-83,84	3-83,84	3-83,84	3-83,84
Building Signs	3-85,86	3-85,86	3-85,86	3-85,86	3-85,86	3-85,86	3-85,86	3-92	NA	3-85,86	3-85,86	3-85,86
Street Signs	3-87	3-87	3-87	3-87	3-87	3-87	3-87	3-87	3-87	3-87	3-87	3-87
Traffic Signs	3-88	3-88	3-88	3-88	3-88	3-88	3-88	3-88	3-88	3-88	3-88	3-88
Parking Lot Signs	3-89,90	3-89,90	3-89,90	3-89,90	3-89,90	3-89,90	3-89,90	3-92	3-89,90	3-89,90	3-89,90	3-89,90

DESIGN GUIDELINES

Matrix

Lighting Matrix

Consult the *Lighting Matrix* for the location of information on the various lighting fixtures at Fort Detrick.

Lighting Matrix

	Main Administrative Zone	FLAIR Armory Zone	1110th Signal Corps Zone	NCI Zone	USAMRIID Zone	USDA Zone	Personnel Support Zone	Family Housing Zone	Nallin Farm Zone	Industrial Zone	Warehouse Zone
General Principles	3-93	3-93	3-93	3-93	3-93	3-93	3-93	3-93	3-93	3-93	3-93
Lighting Types	3-94	3-94	3-94	3-94	3-94	3-94	3-94	3-94	3-94	3-94	3-94
Lighting Placement	3-94	3-94	3-94	3-94	3-94	3-94	3-94	3-94	3-94	3-94	3-94
Roadway Lights	3-95	3-95	3-95	3-95	3-95	3-95	3-95	3-99	3-99	3-95	3-95
Parking Lot Lights	3-96	3-96	3-96	3-96	3-96	3-96	3-96	3-100	3-100	3-96	3-96
Walkway Lights	3-97	3-97	3-97	3-97	3-97	3-97	3-97	3-100	3-100	3-97	3-97
Bollard Lights	3-98	3-98	3-98	3-98	3-98	3-98	3-98	3-101	3-101	3-98	3-98
Wall-mounted Lights	NA	NA	NA	NA	NA	NA	NA	3-102	3-102	NA	NA

Site Furnishings Matrix

Consult the *Site Furnishings Matrix* for the location of information on the various types of site furnishings used at Fort Detrick.

Site Furnishings Matrix

	Main Administrative Zone	FLAIR Armory Zone	1110th Signal Corps Zone	NCI Zone	USAMRIID Zone	USDA Zone	Personnel Support Zone	Family Housing Zone	Nallin Farm Zone	Industrial Zone	Warehouse Zone
Benches and Chairs	3-103, 108	3-103, 108	3-103, 108	3-103, 108	3-103, 108	3-103, 108	3-103, 108	3-103, 108	3-103, 108	3-103, 108	3-103, 108
Tables	3-104, 107	3-104, 107	3-104, 107	3-104, 107	3-104, 107	3-104, 107	3-104, 107	3-104, 107	3-104, 107	3-104, 107	3-104, 107
Trash Receptacles	3-105, 109	3-105, 109	3-105, 109	3-105, 109	3-105, 109	3-105, 109	3-105, 109	3-105, 109	3-105, 109	3-105, 109	3-105, 109
Planters	3-106, 3-110	3-106, 3-110	3-106, 3-110	3-106, 3-110	3-106, 3-110	3-106, 3-110	3-106, 3-110	3-106, 3-110	3-106, 3-110	3-106, 3-110	3-106, 3-110
Bike Rack	3-111	3-111	3-111	3-111	3-111	3-111	3-111	3-111	3-111	3-111	3-111
Tree Grate	3-112	3-112	3-112	3-112	3-112	3-112	3-112	3-112	3-112	3-112	3-112
Water Fountain	3-113	3-113	3-113	3-113	3-113	3-113	3-113	3-113	3-113	3-113	3-113
Flag pole	3-114	3-114	3-114	3-114	3-114	3-114	3-114	3-114	3-114	3-114	3-114
Bollard	3-115	3-115	3-115	3-115	3-115	3-115	3-115	3-115	3-115	3-115	3-115
Railing	3-116	3-116	3-116	3-116	3-116	3-116	3-116	3-116	3-116	3-116	3-116
Smoking Shelter	3-117	3-117	3-117	3-117	3-117	3-117	3-117	3-117	3-117	3-117	3-117
Storage Shed	3-118	3-118	3-118	3-118	3-118	3-118	3-118	3-118	3-118	3-118	3-118

DESIGN GUIDELINES

Matrix

Security and Utilities Matrix

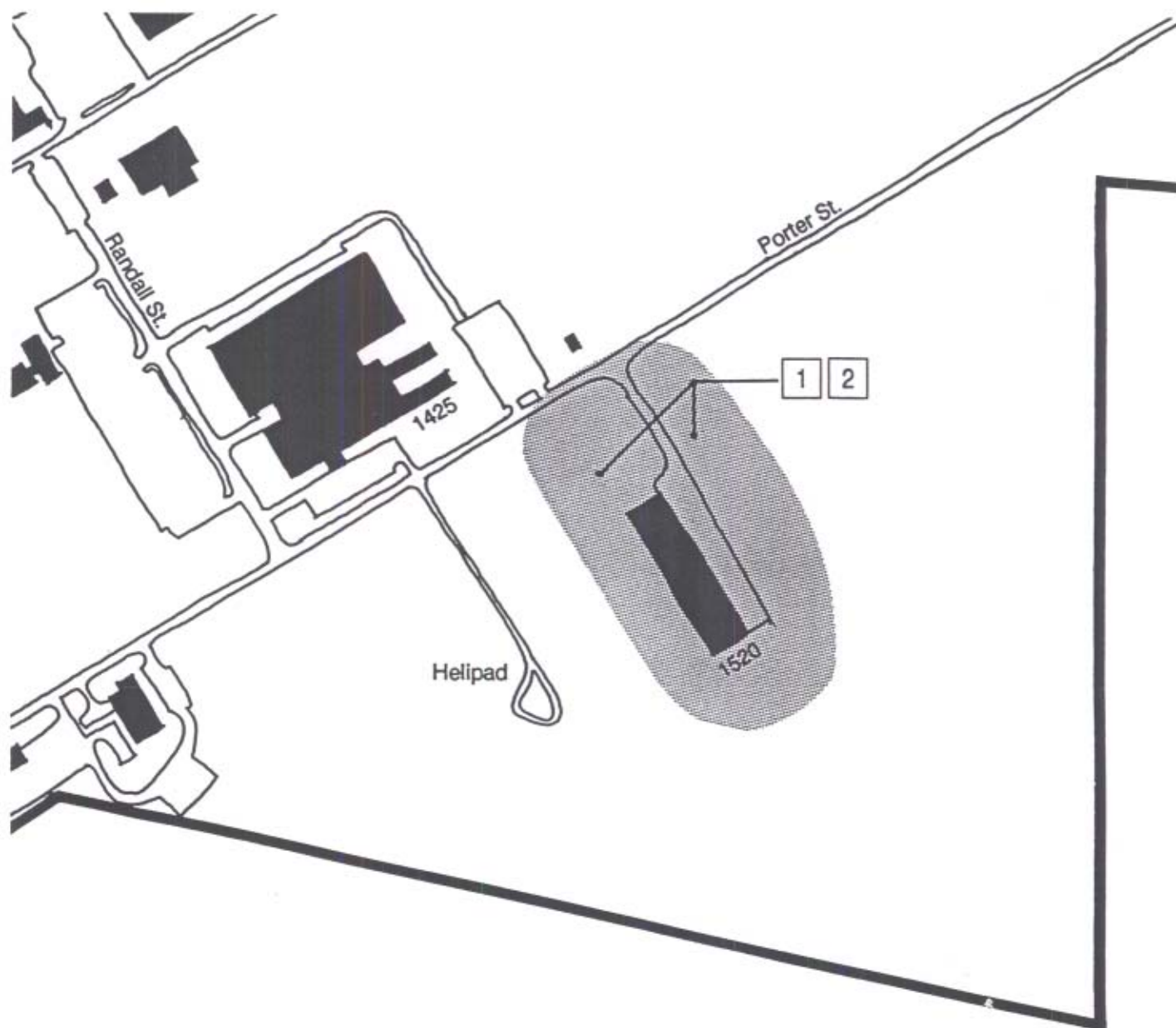
Consult the *Security and Utilities Matrix* for the location of information related to security and utilities.

Security and Utilities Matrix

	All Zones
General Information	3-119, 121
Fences	3-119, 120

VISUAL ZONES

Figure 2-20: Warehouse Zone, Assets and Liabilities




NORTH

Note: Refer to Text for Description of Assets & Liabilities

WAREHOUSE ZONE

The Warehouse Zone is located to the east of Porter Street across the street from Building 1425, USAMRIID's main facility. It is comprised of Building 1520, a large, painted, concrete masonry structure with a loading dock. Building 1520 is a one-story, flat-roofed warehouse with a fenced storage yard and one small, pre-engineered, metal storage building. The building is surrounded by open space on all sides (see Figure 2-20).

Assets

None.

Liabilities

- 1

 The Warehouse Zone is in full view of the research facilities at USAMRIID.
- 2

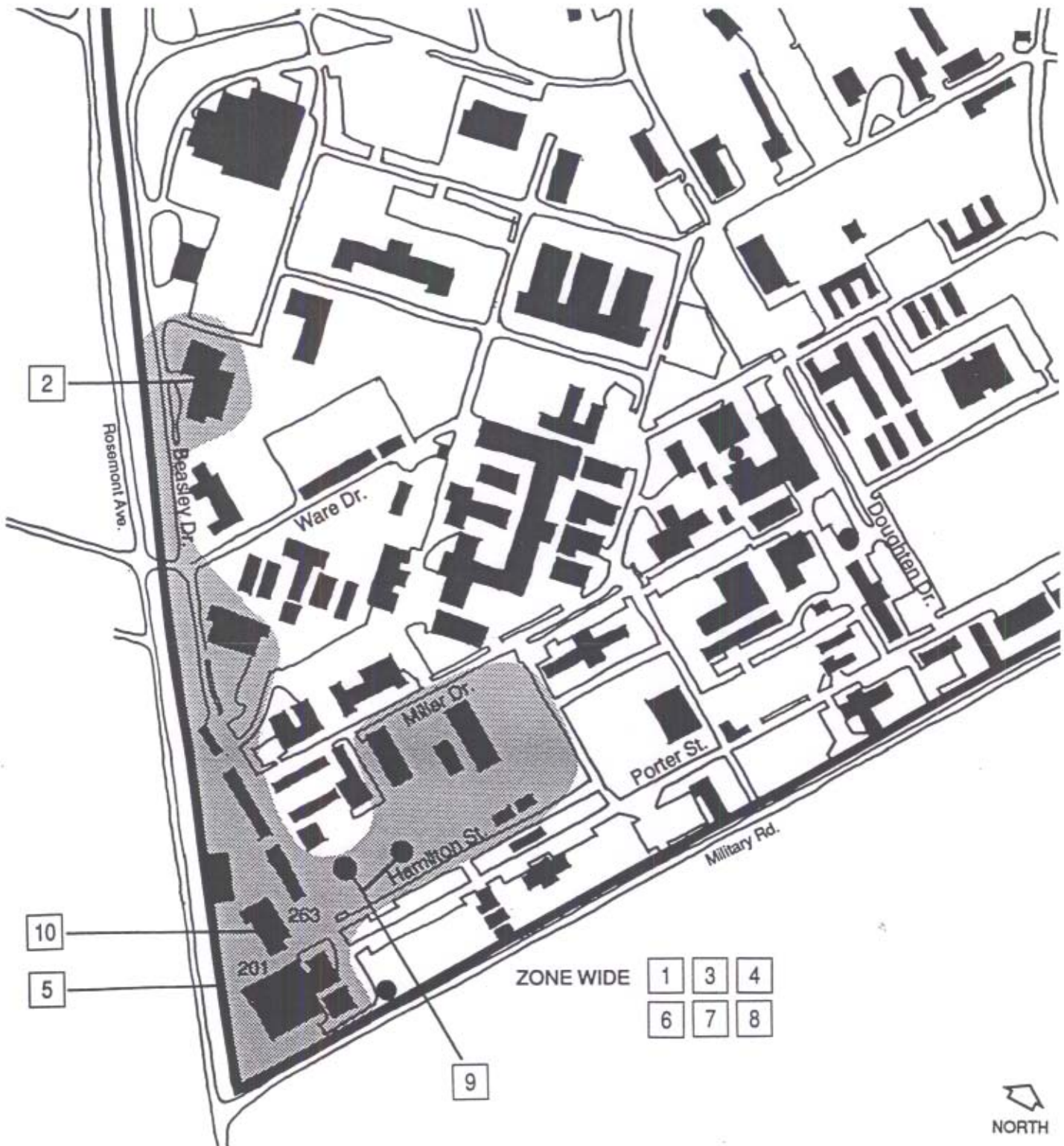
 The storage yard and loading dock are not screened from view from Porter Street and present a cluttered look from the adjacent USAMRIID zone.

Recommendations

- New construction in this zone should respect the colors and materials palette established in the adjacent USAMRIID zone.
- Screen the loading docks and vehicle yard at Building 1520.

VISUAL ZONES

Figure 2-18: Industrial Zone, Assets and Liabilities



Note: Refer to Text for Description of Assets & Liabilities

INDUSTRIAL ZONE

The Industrial zone is located along the Rosemont Avenue boundary. The corner of Military Road and Rosemont Avenue creates the initial impression of the post for visitors after exiting Route 15 north.

This is a densely developed area of older metal, brick, tile, and frame buildings constructed during the 1930s through the 1950s. Industrial-use buildings adjoin residential and personnel support areas along South Porter Street.

Of particular interest is Building 201, the original airplane hangar built in the 1930s when the post was an operational airfield. This building has since been modified to house various administrative offices and maintenance functions. The exterior has been clad in blue, metal-colored siding. The vehicle storage yard behind the building is in full view of passing motorists on Rosemont Avenue (see Figure 2-18).

Assets

None.

Liabilities

- 1 This zone is located in a highly visible public area.
- 2 The decontamination facility and incinerator are situated in full view of the street, and create a poor image of the installation.
- 3 Above-ground steam, communications, and power lines contribute to the industrial look.
- 4 There are conflicts in functions between this area and NCI facilities — zones are interspersed.
- 5 The open storage areas along Rosemont Boulevard are highly visible.
- 6 There is a lack of green/outdoor space for employees.
- 7 There is a high level of visual confusion, compounded by overhead communication and power lines and aboveground steam pipes.
- 8 There is no consistent system of lighting, signage, and site furnishings. This contributes to the visual clutter of the zone.
- 9 Fuel tanks are large and obtrusive; shiny aluminum color draws too much attention.
- 10 Building 263 has the following problems: unscreened dumpster; poorly maintained concrete building surfaces; unattractive downspouts; unattractive glazed tile; obtrusive steam pipes.

Recommendations

General

- Restore the hangar, Building 201, to its original facade, to reflect the early history of Fort Detrick as an airfield.
- Screen or relocate the vehicle storage yard behind Building 201, which faces onto Rosemont Avenue.
- Adopt a consistent color scheme for tanks, piping, metal buildings, and painted surfaces throughout this zone.
- Screen or relocate dumpsters, loading areas, and mechanical equipment away from public view.
- Enhance building entrances through the use of canopies, signage, lighting, and landscaping.
- Bury steam and utility lines or, where this is not feasible, screen them with walls, building elements, and landscaping.

New Construction

- Buildings in this area are likely to be relatively low, with many doors. Care shall be taken to clearly identify main entries, and to orient them so that they are clearly visible from the primary approach to the building.
- Mechanical and utility equipment shall be suitably screened, either by the use of brick walls and landscaping at ground level, or through the use of screen walls and parapets at roof level.
- New buildings shall be one or two stories in height.
- Arrange service areas away from main entrances. Screen them from Rosemont Avenue and Military Road. Facades facing either of these public streets shall present an attractive, neutral face to the general public.
- Clearly define main entrances.
- Because of the industrial nature of the buildings in this zone, roofs are likely to be flat. Parapets shall be of sufficient height to screen roof-mounted mechanical equipment, or suitable screens shall be provided.
- Materials shall be in accordance with general design guidelines.

Existing Construction

Fuel Tanks

- Paint tanks to blend better with surroundings.

Building 263

- Provide curbing away from the building; fill in with grass and foundation plantings.
- Provide a screen around the dumpster to match the building.
- Place steam pipes underground.
- Cover tile with exterior insulation and finish system (Dryvit) (see Figure 2-19).

Building 201

- Screen vehicle storage yard along Rosemont Avenue.
- Remove the metal siding to expose the original structure.
- Repair and paint exterior.
- Retain original openings. Recess any infill of these openings.
- Match glazing pattern and general appearance of replacement windows to original units.
- Paint infill wall at large hangar doors a darker color to distinguish this opening.
- Retain the trim and profile of the existing siding details if new siding must be applied over existing siding.

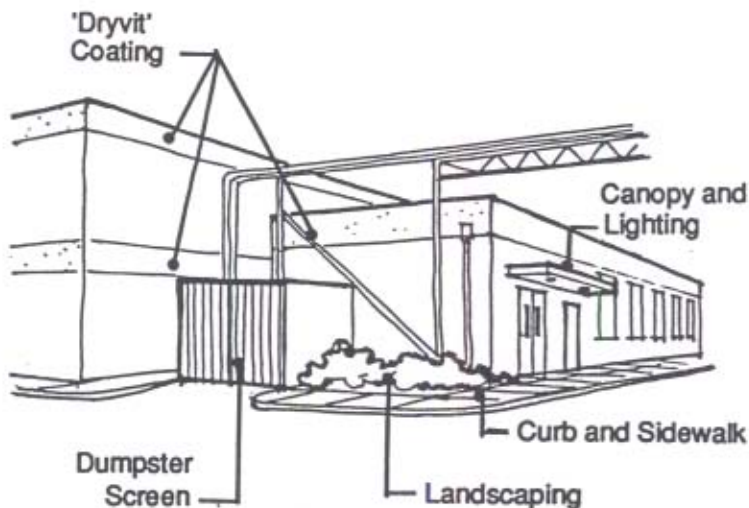
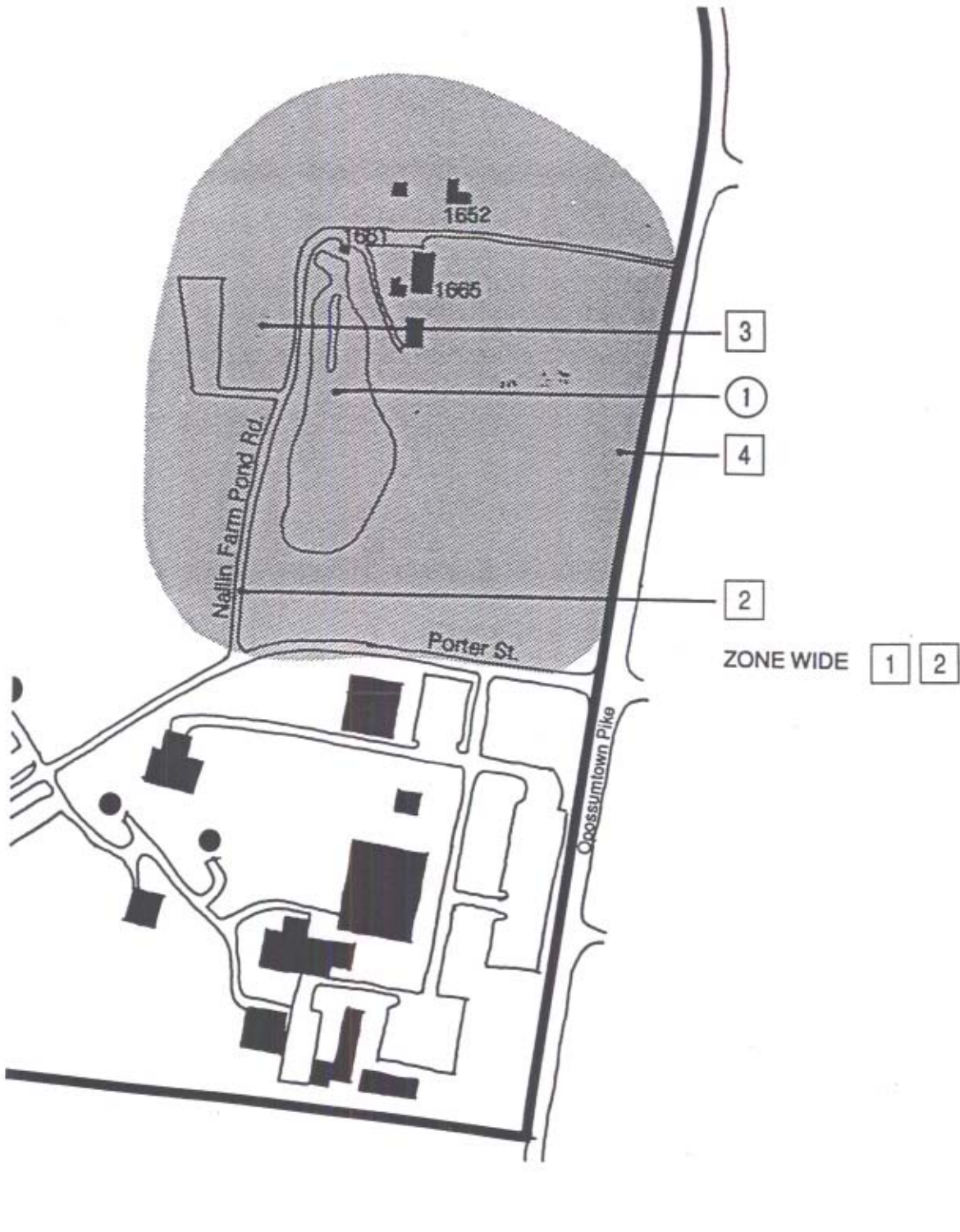


Figure 2-19: Recommendations for Building 263

VISUAL ZONES

Figure 2-17: Nallin Farm Zone, Assets and Liabilities



Note: Refer to Text for Description of Assets & Liabilities

NALLIN FARM ZONE

The Nallin Farm Zone is located along the Opossumtown Pike boundary of the post. The pastoral setting of this area is enhanced by the gently rolling countryside, a pond, recreational structures, and typical Frederick County farm buildings. The historic, well-maintained farmhouse and wood-frame, German bank barn reflect the agrarian tradition of the area. The farmhouse, springhouse, and bank barn (Buildings 1652, 1661, and 1665) are all on the National Register of Historic Places. In addition to being an excellent group recreational area for Fort Detrick, this area serves as an important connection to the agrarian history of Frederick County (see Figure 2-17).

Assets

- ① The pond and open space provide a pleasant setting for recreational activities away from the developed areas of the post.

Liabilities

- 1 There is a lack of consistent and appropriate lighting, signage, and site furnishings.
- 2 There is a lack of clear definition of boundaries of certain use areas: archery range, parking areas, and playground.
- 3 The style of pavilion structures near the barn is out of character with the area.
- 4 The row of double fencing along Opossumtown Pike is out of character with the area. It is not clear why this area needs such a stringent enclosure.

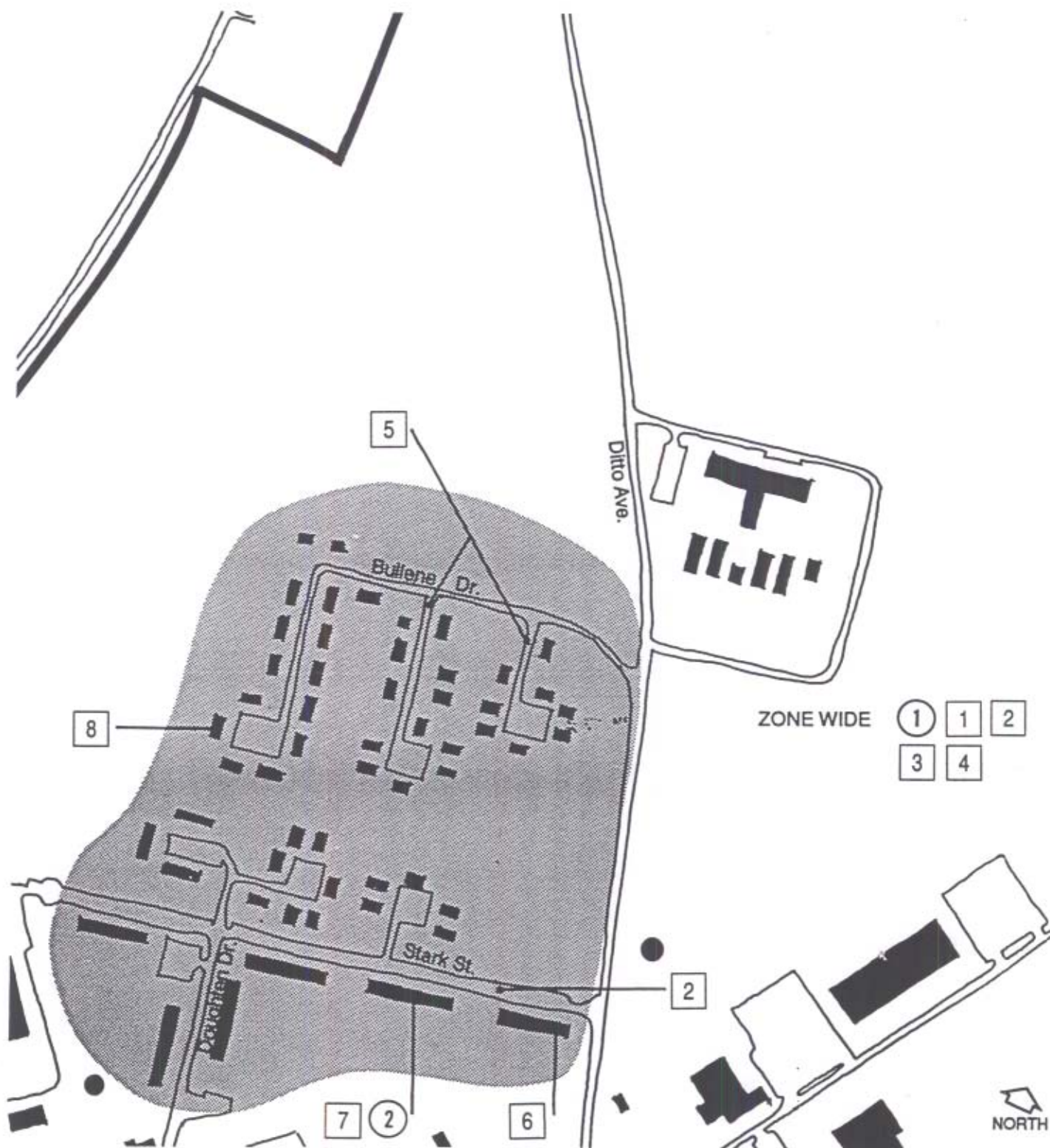
VISUAL ZONES

Recommendations

- New construction in this zone must blend with the historic and agrarian character of the farm buildings, pastoral setting, and open spaces.
- Colors and materials must be in keeping with the farmhouse and barns.
- Stylized contemporary structures must be avoided.
- The existing pavilion should be removed and replaced with a more appropriately styled structure.

VISUAL ZONES

Figure 2-12: Family Housing Zone, Assets and Liabilities



Note: Refer to Text for Description of Assets & Liabilities

FAMILY HOUSING ZONE

The Family Housing Zone is located off Ditto Avenue in two main areas — along Bullene Drive and Stark Street. These areas include several types of family housing: two-story, brick, duplex units built during the 1960s (Type N-1); two-story, frame, multifamily units attached in long rows (Type N-2); two-story, brick, apartment-type buildings constructed during the 1940s (Type N-3); and two-story, frame, duplex units (Type N-4). This zone is buffered from the rest of the post by its location, and is surrounded by open space with pleasing views of the Catocin Mountains (see Figure 2-12).

Assets

- 1 This zone is surrounded by open space that separates it from the employment and industrial aspects of the post.
- 2 Type N-3 units have a sense of rhythm and proportion.

Liabilities

- 1 This zone has an impersonal, institutional image.
- 2 Parking areas conflict with through streets, are too large for a residential area, and are not integrated into the landscape. Parking areas in front of most units are poorly landscaped.
- 3 There is a lack of definition of various types of outdoor space needed: dwelling unit entry and front yard; private space; and common areas. Also, there is a lack of definition for common space, especially playground areas: no pedestrian connections; no benches; lack of plantings to define areas.
- 4 The service areas are located in prominent areas. Frequently, dumpsters are situated in front-yard areas.
- 5 Building 1824 is an example of a two-story, brick, duplex unit built in the 1960s (Type N-1). The heavy screen fencing presents an uninviting, utilitarian aspect to the front of this type of unit. Other problems include: screen enclosures dominate buildings and hide front doors; too many materials are used; chimneys with guy wires are insubstantial; entrances are poorly defined; awnings are dated and insubstantial.

- 6 Building 1016 is a two-story, frame townhouse with siding exterior (Type N-2). The weak front entrances are not enhanced by the placement of mechanical equipment and wood screens immediately next to them.
- 7 Building 1015 is a two-story, red brick, 1940s-vintage, apartment building with gabled entries with canopies (Type N-3). The older buildings present an impersonal, tenement image with weak front-yard space. Other problems include: concrete masonry unit screens are out of keeping with the character of the buildings; front porches are insubstantial and too close together; porch roof junctions create blind valleys; porch railings are dated and useless; "plumbing parts" pipe railings are of marginal usefulness and are unattractive; storm doors look dated; metal awnings are dated and insubstantial.
- 8 Duplex units similar to Building 1875 (Type N-4) have the following problems: line between siding materials is arbitrary and makes the building look bottom-heavy; vertical screen walls are too tall and clash with horizontal siding, and are difficult to maintain; air conditioners are directly in front of entries; screen doors are dated; landscaping is spotty and of poor quality.

VISUAL ZONES

Recommendations

General

- Develop prototype single-family, duplex, and multifamily housing units.
- Establish a consistent color scheme with variations to enhance the residential feel of housing units.
- Strengthen front entrances of multifamily units with lighting and canopy/vestibule structures.
- Replace heavy screen fencing at frontyard areas of duplex units.
- Screen dumpsters and mechanical equipment.
- Every effort should be made to increase the budget designated for plant maintenance, in this zone, with the realization that without maintenance, plants will not thrive and the time and money invested in them will be wasted. All overgrown and unhealthy plants must be systematically removed, as should all plants that exist as individual balls. These plants drain the maintenance resources. A survey must be undertaken to identify these plants and plan for their removal. Plants should be chosen with their natural height and form in mind so that pruning will not be required to maintain the desired effect. Plant a wider variety of small, flowering trees and evergreen trees to extend the visual interest.

New Construction

- New construction shall draw upon the Federal style of the local Frederick area for massing, materials, and scale. In general, the emphasis shall be on permanent, durable building materials, with red brick dominating.
- Brick shall be medium-to-dark red, using standard sizing.
- Oversized or unusually proportioned brick shall not be used.
- Primary roofs shall be sloped in excess of 6 in 12 pitch, up to 12 in 12. Roofs shall be covered with medium-to-dark gray shingles or standing seam metal. Low-slope roofs shall be permissible only for shallow applications, such as entry porches, and shall be covered

with standing seam metal when their pitch is less than 4 in 12.

- Individual units shall be provided with gables or projecting bays to distinguish individual units and provide a sense of rhythm and articulation to groups of units.
- No more than four units shall be arranged together.
- Windows shall be vertical in emphasis, with low sills and high heads. Where ceiling heights allow, window heads shall align with transoms over exterior doors.
- Window sashes shall be either undivided, or shall have grid-pattern muntins. The use of diamond-pattern muntins shall not be permitted.
- Exterior doors shall be paneled wood or insulated steel units.
- Storm doors, if they are present, shall have their major members in alignment with the major members of the primary doors.
- Mechanical equipment shall be located away from building entrances, and shall be screened by landscaping or low brick walls. Service areas shall be similarly screened.

Existing Construction

Buildings Similar to Building 1824 (Type N-1)

- Paint wood siding a consistent color.
- Remove privacy screen and replace with a lower, less obtrusive brick screen that allows the front door to be distinguished.
- Replace metal awnings with permanent porch roof integrated with screen walls.
- Install modern flues enclosed in framed chimney surrounds to eliminate the "stovepipe" look.
- Refer to the general design guidelines for specific information on building elements, materials and colors (see Figure 2-13).

Buildings Similar to Building 1016 (Type N-2)

- Provide new front porches with integrated storage.
- Replace screen walls with horizontal emphasis.
- Relocate compressors.
- Provide consistent foundation plantings (see Figure 2-14).

Buildings Similar to Building 1015 (Type N-3)

- Replace concrete masonry screens with brick to match the buildings.
- Remove existing railings and provide new railings only where required by code, and in full compliance with ANSI specifications.
- Replace metal awnings with permanent porches as part of an integrated design solution to clean up porch-valley conflicts (see Figure 2-15).

Buildings Similar to Building 1875 (Type N-4)

- Provide new front porches with integrated storage; screen walls replaced with horizontal emphasis.
- Relocate compressors.
- Provide consistent foundation plantings (see Figure 2-16).

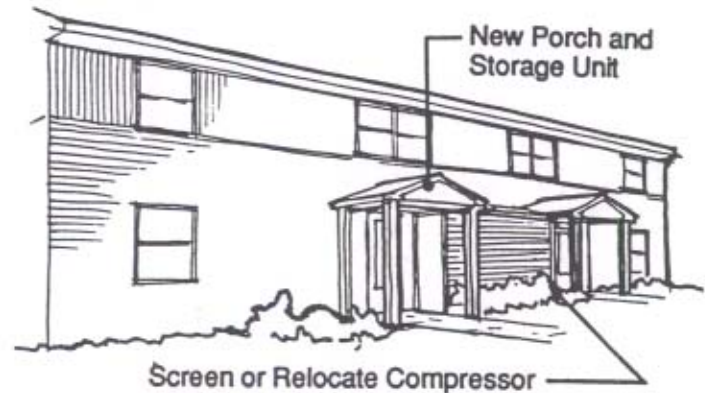


Figure 2-14: Recommendations for Building Type N-2

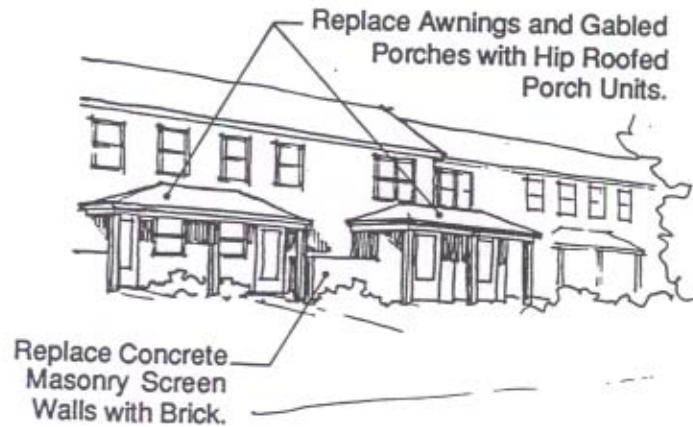


Figure 2-15: Recommendations for Building Type N-3

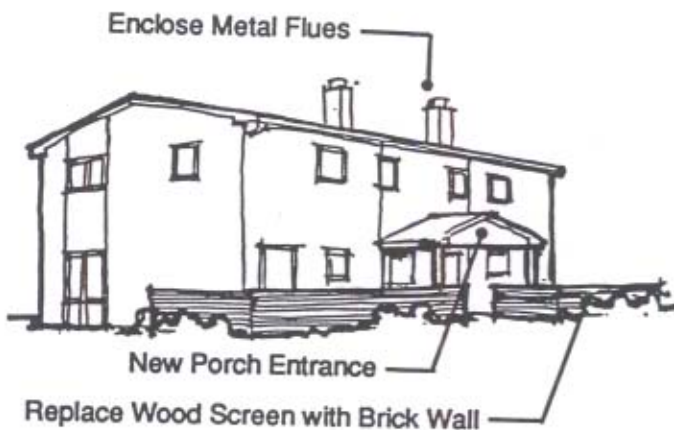


Figure 2-13: Recommendations for Building Type N-1

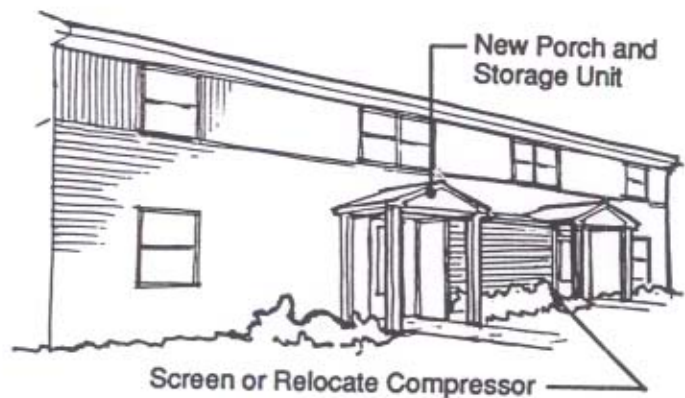
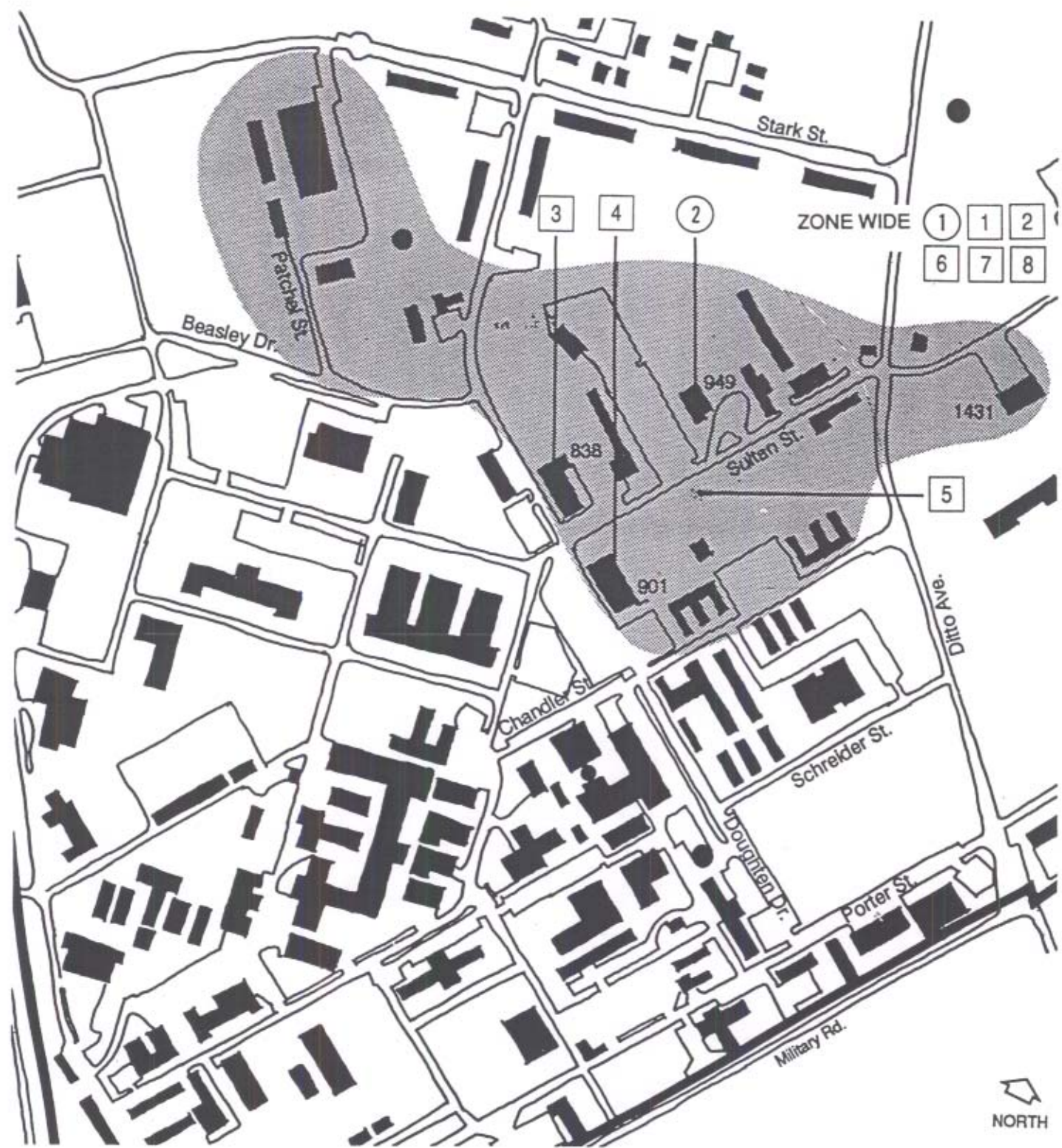


Figure 2-16: Recommendations for Building Type N-4

Figure 2-11: Personnel Support Zone, Assets and Liabilities



Note: Refer to Text for Description of Assets & Liabilities

PERSONNEL SUPPORT ZONE

The Personnel Support Zone is located at the core of the main post. It is a blend of new and old facilities, including recreational areas, a swimming pool, and tennis courts. The newer structures (Buildings 1431 and 949) possess some consistency of design because they are all brick. However, many temporary, WW II, wood-frame buildings remain in this area. The function of these structures is not evident from their exteriors and they give this area a cluttered, crowded appearance (see Figure 2-11).

Assets

- 1 The central location of this zone allows all employees and residents access to the facilities.
- 2 Building 949 is a one-story, red brick structure with white stucco cornice and gabled roof, typical of recently completed buildings in this zone.

Liabilities

- 1 The zone has a crowded appearance, emphasized by confusion of architectural styles and many different functional uses.
- 2 The functions of buildings are not identifiable from their exterior.
- 3 The gym, Building 838, is a nondescript, wood-frame structure with asbestos panels over siding. A brick canopy entrance, which was added, does little to enhance its identity.
- 4 Building 901 is another example of a wood-frame structure that has been reclad in panelized siding. The entrance is weak and poorly identified, and the approach to the building is directly from the paved drive with no pedestrian zone.
- 5 Recreational areas are not buffered from conflicting uses.
- 6 There is a lack of trees and green space around recreational facilities.
- 7 There is no pedestrian circulation system that would connect this area to surrounding zones and allow people to walk to this area.
- 8 There is a lack of consistency in lighting, signage, and site furnishings that contributes to the confusing visual quality of this zone.

VISUAL ZONES

Recommendations

General

- Remove WW II-vintage, frame buildings.
- Screen the swimming pool and recreational areas from adjacent uses.
- Improve building entrances.
- Observe an established palette for masonry and painted surfaces in this zone.
- Every effort should be made to increase the budget designated for plant maintenance, in this zone, with the realization that without maintenance, plants will not thrive and the time and money invested in them will be wasted. All overgrown and unhealthy plants must be systematically removed, as should all plants that exist as individual balls. These plants drain the maintenance resources. A survey must be undertaken to identify these plants and plan for their removal. Plants should be chosen with their natural height and form in mind so that pruning will not be required to maintain the desired effect. Plant a wider variety of small, flowering trees and evergreen trees to extend the visual interest.

New Construction

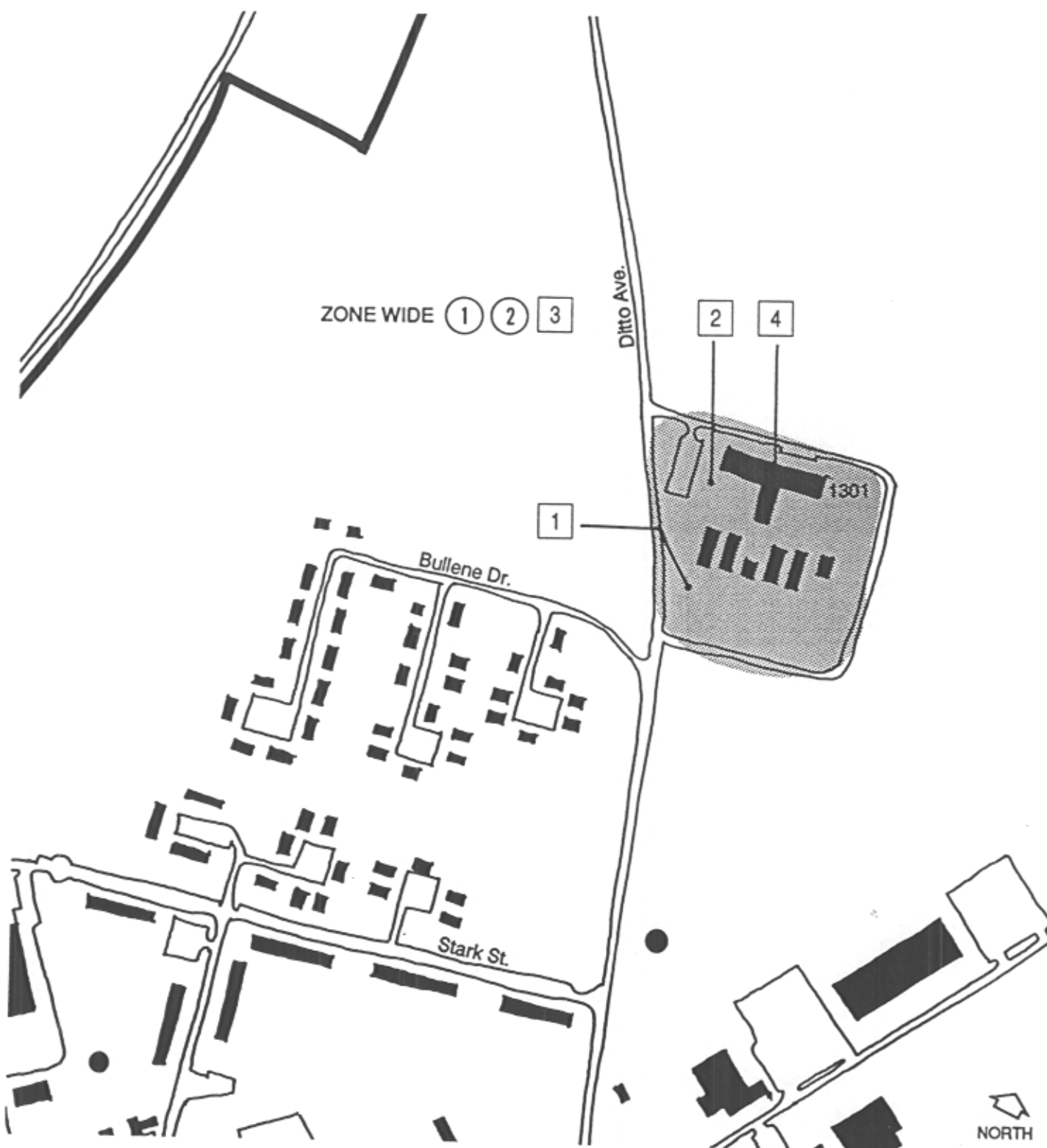
- New buildings in the Personnel Support Zone shall follow the general installation design guidelines.
- Buildings shall be low and easily accessible to the handicapped.
- Buildings shall be one or two stories in height. Materials shall be in accordance with the general design guidelines.
- All buildings shall be sited to allow ease of access by pedestrians and motorists alike.
- A distinction between public access and private service areas is particularly important in this area.
- This zone should be further subdivided into a recreational area (gymnasium, swimming pool, recreation center) and a personnel services area (exchange, cleaners, banking, etc.).

Existing Buildings

- Many of the existing buildings are temporary, are in poor condition, and are planned for demolition in the near future. These buildings should be replaced with permanent accommodations.

VISUAL ZONES

Figure 2-10: USDA Zone, Assets and Liabilities



Note: Refer to Text for Description of Assets & Liabilities

USDA ZONE

The USDA zone is located at the northern end of Ditto Avenue. This self-contained compound consists of the USDA's main Frederick facility (Building 1301) and a large greenhouse (see Figure 2-10).

Assets

- ① The setting for this zone allows for organized expansion.
- ② This area is well maintained and has a pleasing setting surrounded by open space.

Liabilities

- ① There is no pedestrian connection to the rest of the installation, creating a sense of isolation.
- ② The location of fencing creates a sense of restriction to the visitor parking area and main entrance.
- ③ There is a lack of consistent lighting, signage, and site furnishings.
- ④ The main entry to Building 1301 is not readily visible from the entry drive.

Recommendations

General

- Every effort should be made to increase the budget designated for plant maintenance, in this zone, with the realization that without maintenance, plants will not thrive and the time and money invested in them will be wasted. All overgrown and unhealthy plants must be systematically removed, as should all plants that exist as individual balls. These plants drain the maintenance resources. A survey must be undertaken to identify these plants and plan for their removal. Plants should be chosen with their natural height and form in mind so that pruning will not be required to maintain the desired effect. Plant a wider variety of small, flowering trees and evergreen trees to extend the visual interest.

New Construction

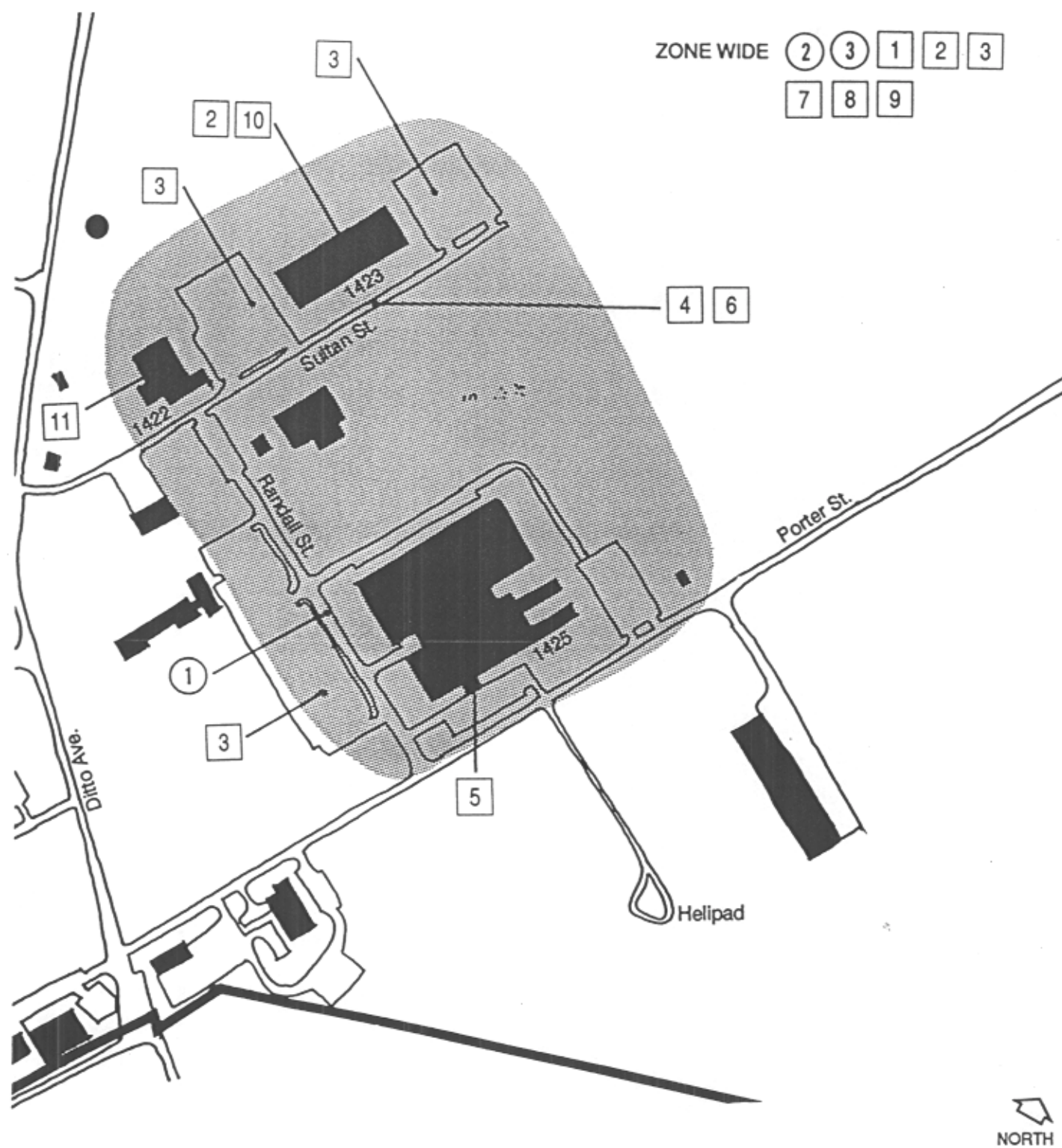
- Plans shall be generally balanced and symmetrical, with well-defined and separated public and service areas. Such functional distinctions shall extend to the new building's relationship with existing buildings in the area.
- Pitched roofs shall have a minimum slope of 4 in 12, with steeper slopes encouraged, up to a maximum of 12 in 12.
- Buildings shall be two- or three-stories high.

Existing Buildings

- Building 1301 is a two-story, red brick building with a gabled, asphalt, shingle roof. The building has a symmetrical plan, with the main entrance facing north, away from the principal approach. The complex is poorly identified and the entrance is not evident to the visitor. Additionally, parking is not convenient to the entrance. Building 1301, like the lab buildings in the NCI Zone (Buildings 538, 560, and 568 for example), is a typical Fort Detrick building, and suffers from many of the same deficiencies.
- Provide or enlarge entry porches, with full handicapped accessibility.
- Relocate electrical power lines and transformers as far as possible from front entries. Overhead lines should be buried and transformers should be relocated to screened service yards or underground vaults.

VISUAL ZONES

Figure 2-8: USAMRIID Zone, Assets and Liabilities



Note: Refer to Text for Description of Assets & Liabilities

JSAMRIID ZONE

The USAMRIID Zone is located between Porter Street and Sultan Drive. In addition to the U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID), the U.S. Army Medical Materiel Agency (USAMMA) and the Directorate of Information Management (DOIM) are located in this area. Buildings in this area benefit from the ample open space, making them accessible and readily identifiable. The rectangular street grid and campuslike feel present an opportunity for improved vehicular and pedestrian access to the buildings. This layout is enhanced by street tree plantings along Randall Street.

Although the campus atmosphere is evident, little effort has been made to integrate building styles or materials, or to relate the structures to the open spaces. Generally, entrances to the buildings are poorly aligned with their associated parking areas.

Buildings in this zone are generally newer, one-story structures with masonry exteriors built during the 1970s and 1980s. Building 1425, which houses USAMRIID, is an architectural concrete and brick structure with an imposing facade along Porter Street. The structure's gray tones and the low, horizontal, asymmetrical facade are in contrast to other new construction on the base, where red brick and symmetry are the standard in most cases.

The helipad is located across from Building 1425. This connection between the entry to USAMRIID and the road to the helipad is an important one because it is the first thing seen by visitors arriving by helicopter (see Figure 2-8).

Assets

- ① The rectangular street grid and street tree plantings along Randall Street contribute to the clarity of the site plan for this zone.
- ② The site plan has the campus-type atmosphere that is an appropriate image for the post and for the activities in this particular zone.
- ③ The open space surrounding the zone provides the opportunity for orderly expansion.

Liabilities

- ① There is a lack of integration in building styles and materials.
- ② Entrances to buildings are poorly defined and lack connections with parking areas.
- ③ The parking areas are large, massive expanses of unbroken asphalt.
- ④ The sidewalk system is incomplete.
- ⑤ The entrance to Building 1425 has a sterile quality.
- ⑥ The street tree plantings are incomplete.
- ⑦ The selection of plant materials does little to improve the visual quality of the environment but the plants require a high level of maintenance.
- ⑧ There is a lack of variety of plant materials that would provide visual interest year round.
- ⑨ There is a lack of consistency in lighting, signage, and site furnishings.
- ⑩ Building 1423 has the following problems: exterior materials and color do not relate well to other buildings in this area; entrances are on sides away from the parking lots, down long sidewalks; the building is very poorly scaled and detailed; the mansard roof has no function and does not match from one section to another; lighting is inadequate.
- ⑪ The addition to Building 1422 does not match the color of the original structure.

Recommendations

General

- Every effort should be made to increase the budget designated for plant maintenance, in this zone, with the realization that without maintenance, plants will not thrive and the time and money invested in them will be wasted. All overgrown and unhealthy plants must be systematically removed, as should all plants that exist as individual balls. These plants drain the maintenance resources. A survey must be undertaken to identify these plants and plan for their removal. Plants should be chosen with their natural height and form in mind so that pruning will not be required to maintain the desired effect. Plant a wider variety of small, flowering trees and evergreen trees to extend the visual interest.
- Complete the street tree plantings in this zone.

New Construction

- Generally, new buildings in the USAMRIID Zone shall follow the new construction design guidelines outlined for the rest of the post.
- Future buildings in the USAMRIID Zone are likely to be quite large, and so may require special consideration of scale and massing.
- As is the case in the NCI Zone, the overall objective is the establishment of a research-campus atmosphere.
- Buildings shall be two or three stories in height.
- Buildings shall have pitched roofs of moderate-to-steep slopes as far as it is possible. Especially large buildings may use pitched roofs as accent elements, with the bulk of the roof being flat.
- Materials shall be in accordance with the general installation guidelines.

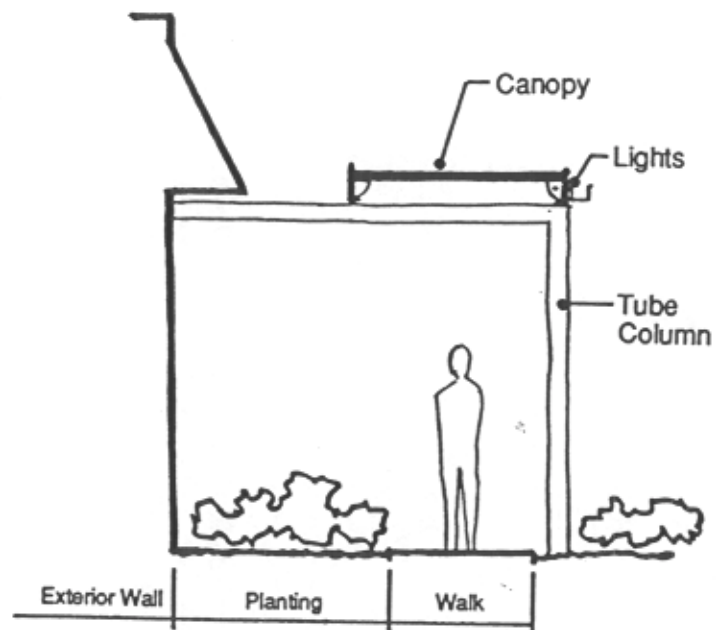
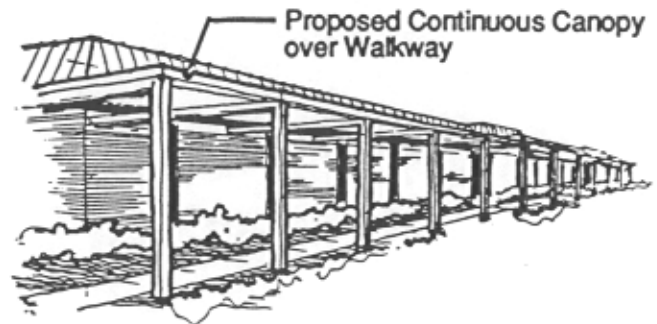
Existing Construction

- Existing construction in the USAMRIID Zone is typically low and horizontal in emphasis, with buildings often covering considerable areas. Additions to these buildings shall be in forms and materials compatible with the existing construction, with greater attention paid to ease of access from parking areas.
- The road to the helipad should be realigned to focus directly on the entry to Building 1425.

Building 1423

- Provide a covered walkway extending along the main facade to shelter the walkway from the elements, provide lighting, and screen undesirable design elements (see Figure 2-9).

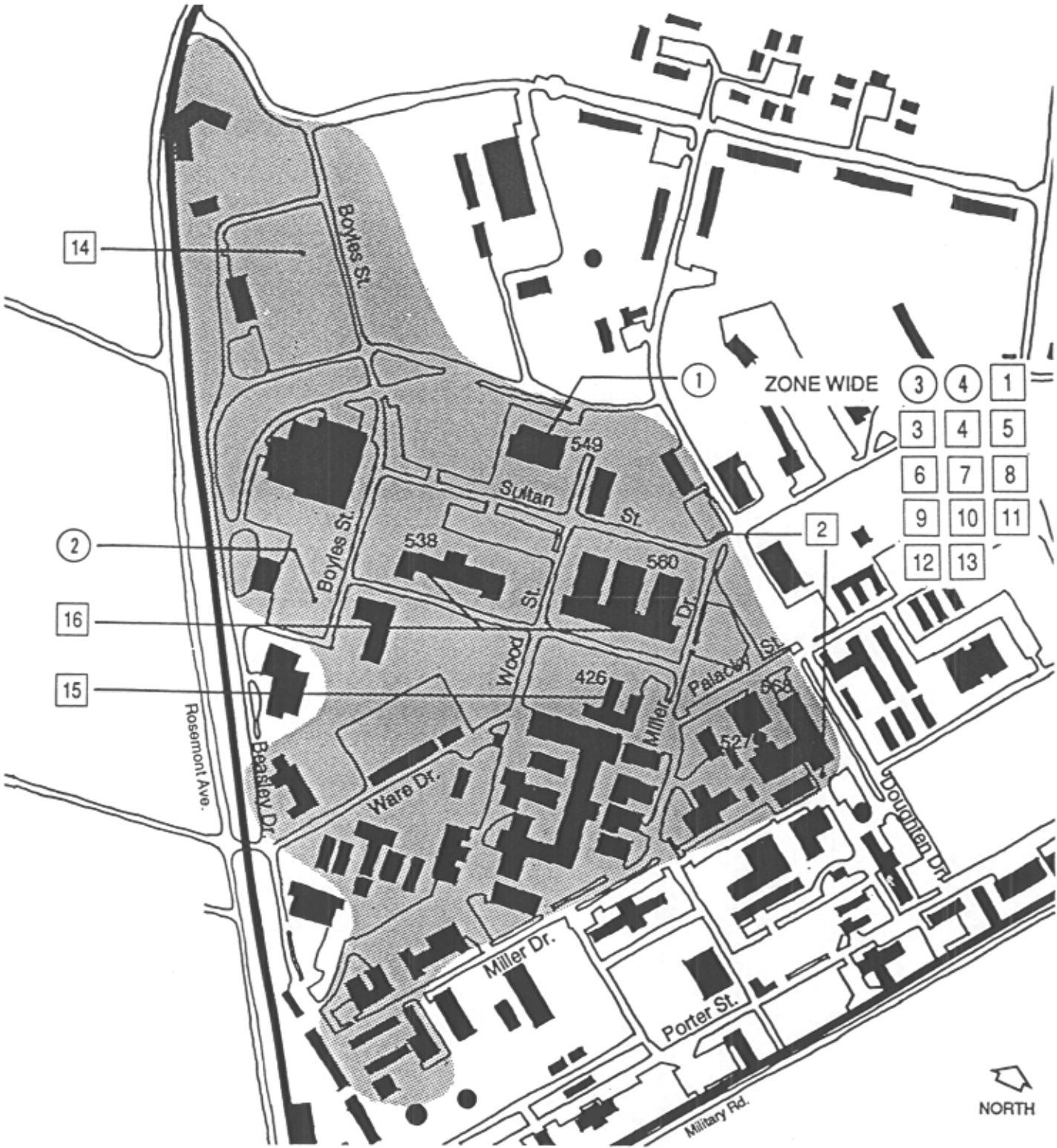
Figure 2-9: Recommendations for Building 1423



Canopy Section

VISUAL ZONES

Figure 2-6: NCI Zone, Assets and Liabilities



Note: Refer to Text for Description of Assets & Liabilities

NCI Zone

The NCI Zone is located on the western part of the main post, bounded by the Industrial Zone and Rosemont Avenue on the west, Doughten Drive to the east, Miller Drive to the south, and Stark Street to the north. This 70-acre site was deeded to NCI in the early 1970s and consists of 67 buildings. It is densely developed with older brick and tile laboratory, office, warehousing, and animal containment facilities, interspersed with some new buildings constructed by NCI during the last decade.

A great deal of Fort Detrick's history is an integral part of this area. The history of biological research at the installation is suggested in the structures, which were built during a period following WW II through the 1960s. It was during that 20-year period that many landmark research projects were launched. Additionally, the million-litre test sphere (Building 527), which is on the National Register of Historic Places, is found here. However, the lack of a central historic core gives this area a disjointed appearance, and the chronological development of the facility is not readily perceived (see Figure 2-6).

Assets

- ① The Library/Conference Center (Building 549) is a successful new structure employing the postmodern look. It is well sited, with an approach and parking that complement rather than detract from its character.
- ② The greenhouses are visually interesting and relatively tidy in appearance. However, they are enclosed behind a security fence.
- ③ Masonry laboratory buildings (Type F) are the closest approximation to a "typical" Fort Detrick building, and they express forms and materials that are to be encouraged in future development, i.e., red brick and gabled roofs.
- ④ There is a uniform signage system, although it is distinctive from the rest of the post.

Liabilities

- ① The zone is visually confusing and lacks a sense of place to provide orientation.
- ② Poor alignment of the street grid in this area creates awkward entry and parking access. In many cases, no buffer or transition zone is provided between the street and the building entrances.
- ③ Poor street alignment creates awkward parking and building entrance access.
- ④ The skewed nature of the street system in relation to other streets creates confusing intersections and awkward building arrangements.
- ⑤ There is no street hierarchy system.
- ⑥ The siting of the buildings results in leftover or negative outdoor spaces that have not been designed to benefit the employees in this area. These spaces should be redesigned to form outdoor rooms or connections between the buildings and to serve as pedestrian linkages between different spaces.
- ⑦ There is no hierarchy of buildings; no way to determine which are the major facilities.
- ⑧ Brick structures of various colors and masses do not complement each other.
- ⑨ Overhead communications and power lines and aboveground steam lines are visually objectionable and contribute to the cluttered, industrial atmosphere.
- ⑩ The street tree plantings are incomplete.
- ⑪ The selection of plant materials does little to improve the visual quality of the environment but the plants require a high level of maintenance.
- ⑫ There is a lack of variety of plant materials that would provide visual interest year round.
- ⑬ There is a lack of consistency in lighting and site furnishings, which contributes to the confusing visual quality of this zone.

Liabilities (cont.)

- 14 Long, low, concrete masonry animal containment buildings such as Building 1029 dominate the northern end of this area. These buildings are utilitarian and cluttered in appearance. They are not screened, and are clearly visible from Rosemont Avenue.
- 15 Building 426 is a one-story building that has been renovated and embodies postmodern detailing and treatment of the exterior. It is poorly sited in a low area immediately adjacent to the tall, rather nondescript "anthrax tower."
- 16 Masonry laboratory buildings (Type F) such as Buildings 538, 560, and 568 have poorly defined, unsheltered main entrances. Transformers and power lines consistently are located adjacent to the entrances in the most inappropriate and unattractive manner. Almost as much as the elevated steam pipes, these electrical installations contribute to the industrial atmosphere of the post.

Recommendations

General

- Designate important historic structures and provide for their preservation and restoration.
- Replace wood-frame structures not deemed historically significant.
- Site new construction in alignment with the street grid. Consider modification of the street grid in certain areas to improve existing building siting.
- Establish and observe a masonry and painted-surface color scheme for this zone. Painted structures such as above-ground utilities, tanks, and warehouses should follow an established color scheme.
- Improve building entrances by the addition of canopies and improved pedestrian access.
- Relocate or screen transformers, dumpsters, and mechanical equipment.
- Screen the animal containment buildings.
- Observe a standard for lighting, signage, and site furnishings.
- Every effort should be made to increase the budget designated for plant maintenance in this highly visible zone, with the realization that without maintenance, plants will not thrive and the time and money invested in them will be wasted. All overgrown and unhealthy plants and plants that exist as individual balls must be systematically removed. These plants drain the maintenance resources. A survey must be undertaken to identify these plants and plan for their removal. Plants should be chosen with their natural height and form in mind so that pruning will not be required to maintain the desired effect. Plant a wider variety of small, flowering trees and evergreen trees to extend the visual interest.

New Construction

- The NCI Zone represents the core of the research campus at Fort Detrick. As such, it is important that the architectural theme be particularly strong in this zone. There are already several existing laboratory buildings in general congruence with the overall theme. Pitched roofs, red brick exteriors, punched windows, and symmetrical arrangements shall be encouraged, in common with existing buildings.
- New buildings shall be sited to define the street grid in this zone and to clarify its relationship with the surrounding post. The existing grid is skewed with respect to the rest of the post, and is aligned better with respect to views of the mountains than are other parts of the post. This affords opportunities to develop these views as a design element.
- Plans shall be generally balanced and symmetrical, with well-defined and separated public and service areas. Such functional distinctions shall extend to the new buildings' relationship with existing buildings in the area.

Pitched roofs shall have a minimum slope of 4 in 12, with steeper slopes encouraged, up to a maximum of 12 in 12.

- Buildings shall be two- or three-stories high.

Existing Buildings

- Additions or changes to existing construction shall be compatible with the existing construction in form, scale, massing, and materials.

Type F Buildings (Buildings. 538, 560, 568)

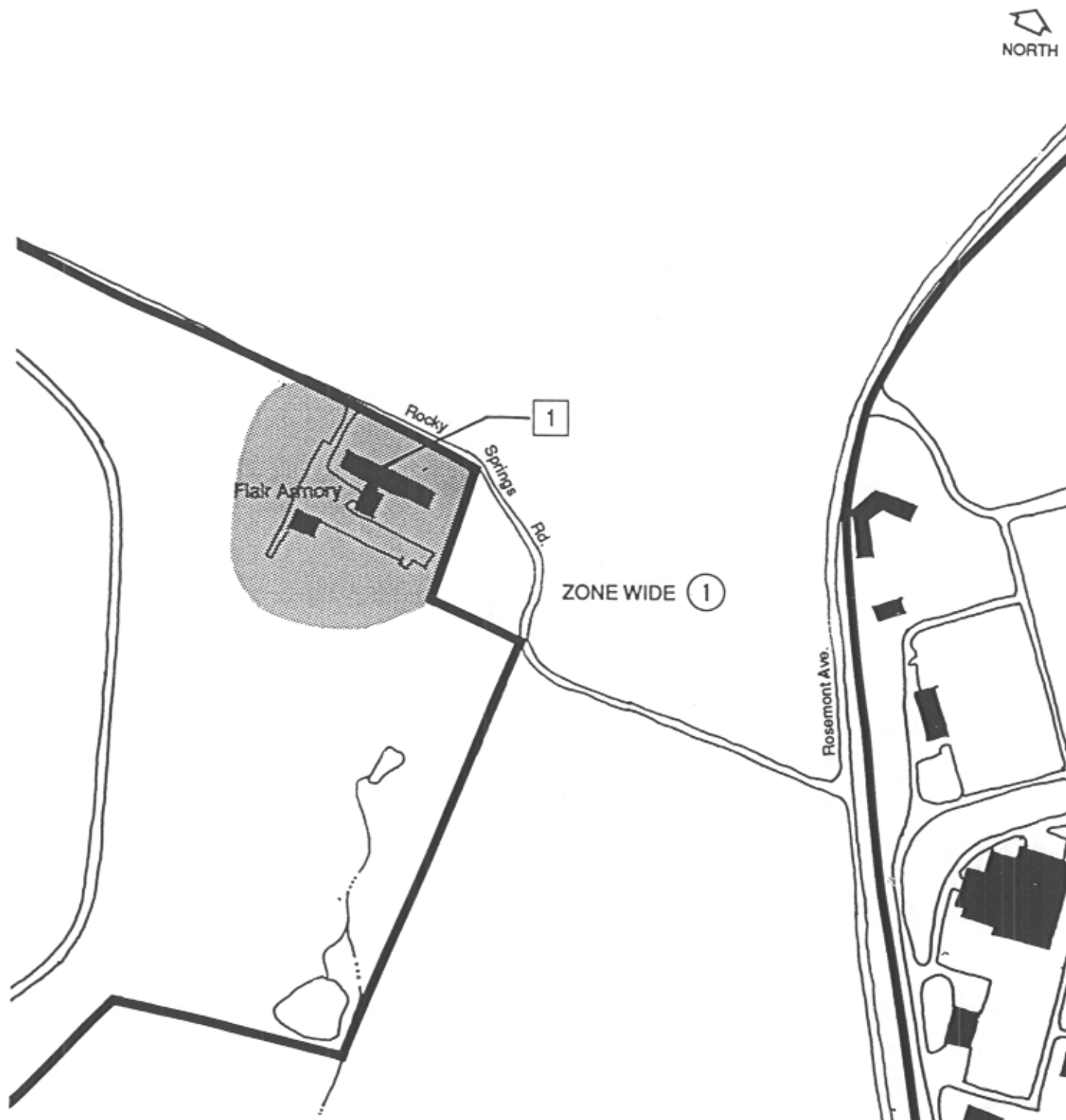
- Provide or enlarge entry porches, with full handicapped accessibility (see Figure 2-7).
- Relocate electrical power lines and transformers as far as possible from front entries. Overhead lines should be buried and transformers should be relocated to screened service yards or underground vaults.



Figure 2-7: Recommendations for Type F Buildings

VISUAL ZONES

Figure 2-4: FLAIR Armory Zone, Assets and Liabilities



Note: Refer to Text for Description of Assets & Liabilities

FLAIR ARMORY ZONE

The FLAIR Armory Zone is located in Area B off Rocky Springs Road, approximately one-half mile west of the main post. This area consists of a fenced compound with a training center and parking area. The armory facility (Building 1242) is set back from the road. There is a lawn with mature trees that present a pleasing appearance to motorists (see Figure 2-4).

Assets

- ① The zone is located in a visually pleasing area, surrounded by farm land and a low-density, residential neighborhood.

Liabilities

- ① Masonry openings of Building 1242 have been closed in, flush, with mismatched brick and mortar toothed into the wall, presenting a sloppy appearance. The building entrance is invisible from the driveway and inconvenient to parking. Landscaping hides the building's entrance.

Recommendations

General

- Every effort should be made to increase the budget designated for plant maintenance, in this zone, with the realization that without maintenance, plants will not thrive and the time and money invested in them will be wasted. All overgrown and unhealthy plants must be systematically removed, as should all plants that exist as individual balls. These plants drain the maintenance resources. A survey must be undertaken to identify these plants and plan for their removal. Plants should be chosen with their natural height and form in mind so that pruning will not be required to maintain the desired effect. Plant a wider variety of small, flowering trees and evergreen trees to extend the visual interest.

New Construction

- This area is detached from the main body of the post, and faces an off-post area that will soon be subject to residential development. The existing facility is low and horizontal, and is well screened by mature trees. While there is little that is outstanding about the existing FLAIR Armory facility, new construction should continue the theme of low-key horizontality.
- New construction shall be relatively inconspicuous from the road, to avoid intruding on what is becoming a residential neighborhood.
- New constructions shall be one or two stories, and shall be scaled to respect the residential character of the neighborhood.
- Buildings shall be screened by landscaping from adjacent properties.
- Buildings shall use similar materials to those proposed for the rest of the installation.

Existing Construction

Building 1242

- Shift landscaping emphasis from entry area to east side of the building; open up a clear view of the building.
- Remove nonconforming masonry; restore the outline of the old window openings and infill with masonry recessed 3/4" from the face of the building, preserving the appearance and rhythm of window openings.
- Provide a canopy that extends the entrance around to the drive (see Figure 2-5).

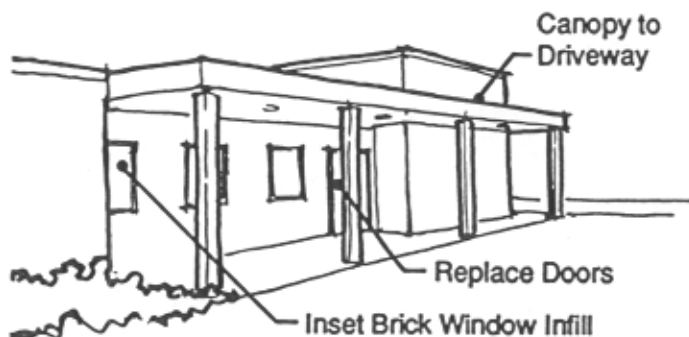
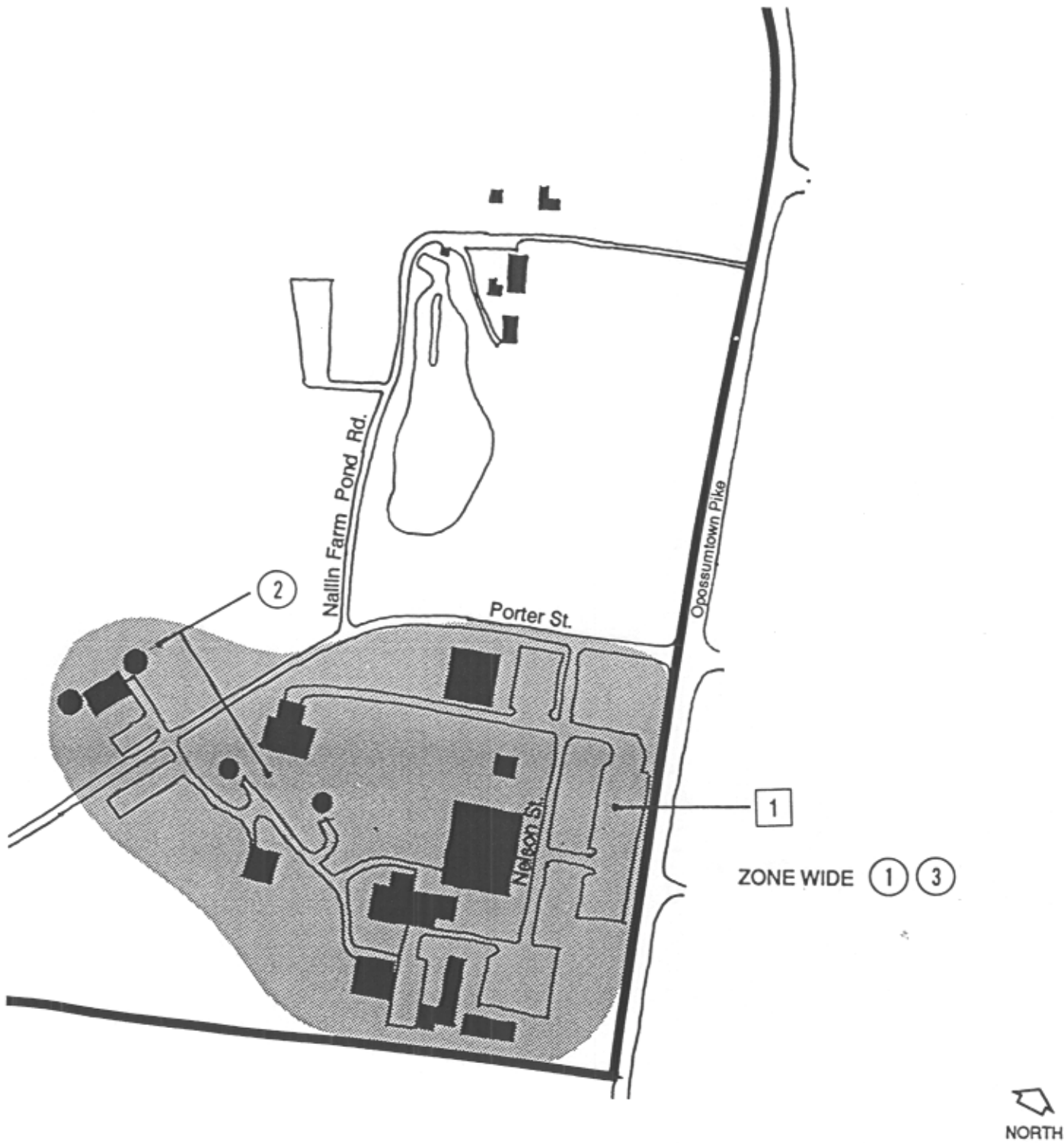


Figure 2-5: Recommendations FLAIR Armory

VISUAL ZONES

Figure 2-3: 1110th Signal Battalion Zone, Assets and Liabilities



Note: Refer to Text for Description of Assets & Liabilities

110TH SIGNAL BATTALION ZONE

The 1110th Signal Battalion Zone is located along the eastern boundary of the post next to Opossumtown Pike. The facilities for the 1110th Signal Battalion are located in this area. This zone is a separate, well-defined compound with large, communications satellite dishes, and support buildings built during the 1960s and later. The streets, site layout, parking areas, and tree plantings all contribute to the unified visual structure of this area. The large, white, satellite dishes project a high-tech image and are visually interesting at close range, as well as when viewed from a distance. Their imposing white forms dominate the skyline at this end of the base (see Figure 2-3).

Assets

- ① The site layout is delineated by the siting of buildings, streets, and street tree plantings.
- ② The satellite dishes are a distinctive and positive visual landmark, both within the post and for the surrounding community.
- ③ The buildings in this zone are constructed from a similar material's palette, and they are well situated around a central parking area.

Liabilities

- ① The large, parking lot adjacent to the fence along Opossumtown Pike is not screened.

Recommendations

General

- Every effort should be made to increase the budget designated for plant maintenance, in this zone, with the realization that without maintenance, plants will not thrive and the time and money invested in them will be wasted. All overgrown and unhealthy plants must be systematically removed, as should all plants that exist as individual balls. These plants drain the maintenance resources. A survey must be undertaken to identify these plants and plan for their removal. Plants should be chosen with their natural height and form in mind so that pruning will not be required to maintain the desired effect. Plant a wider variety of small, flowering trees and evergreen trees to extend the visual interest.

New Buildings

- New construction shall continue the architectural theme established by the existing buildings (Buildings 1671 and 1607), with simple massing and the use of brick with precast concrete accents.
- Pre-engineered metal construction should be confined to the immediate vicinity of the satellite antennas, where such construction can be seen to be clearly subordinate to the equipment it serves.
- All new construction shall respect the visual dominance of the satellite antennas, and should not attempt to compete with them.
- Since the nature of the activities of the 1110th Signal Company does not encourage the use of windows, buildings should be relatively plain, with windows used as accent devices rather than as repetitive elements.
- Views from within buildings should be chosen to highlight the adjacent Nallin Farm, Catocin Mountain, and the satellite antennas.

Existing Buildings

- Any alterations to existing buildings shall be of similar materials and proportions to the existing buildings. For example, plainly massed red brick and precast concrete are appropriate for alterations to Buildings 1607 and 1671, while white, precast sections with horizontal strip windows are appropriate for alterations to Building 1674 and similar buildings.

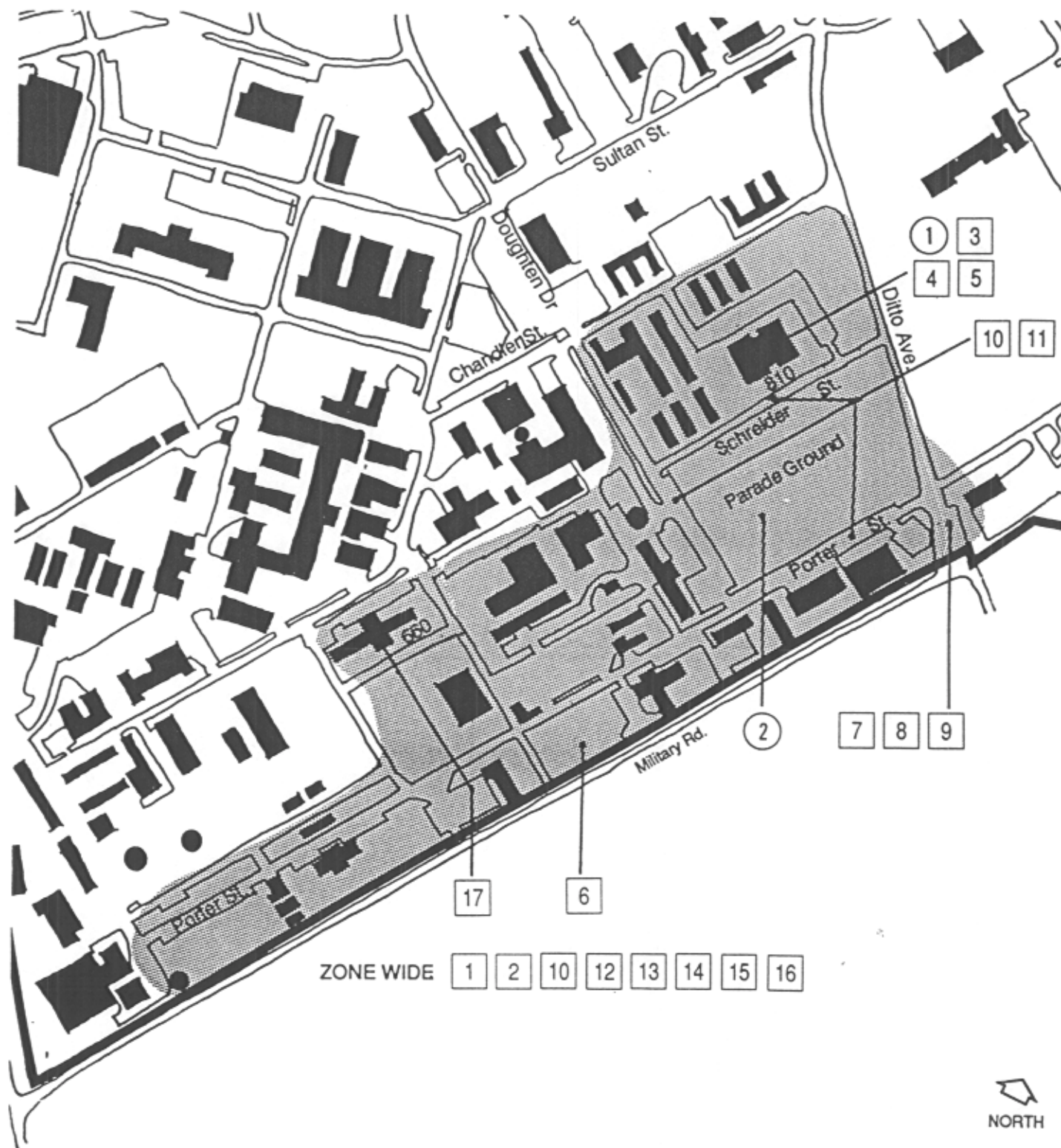
INTRODUCTION

This section presents information specific to each of the visual zones. A general description and list of the assets and liabilities, keyed to a site map, are given for each zone. Recommendations are also given. This list of recommendations is not prioritized, because they all are

important and interdependent. These recommendations should be consulted during the planning process to help direct budgetary and administrative actions.

VISUAL ZONES

Figure 2-1: Main Administrative Zone, Assets and Liabilities



Note: Refer to Text for Description of Assets & Liabilities.

MAIN ADMINISTRATIVE ZONE

The Main Administrative Zone is located along the Military Road boundary. Its visually prominent location does not, at the present time, contribute to a strong visual image of the post.

The Main Administrative Zone is located directly inside Fort Detrick's main gate at the Seventh Street entrance. The parade ground and Building 810, the USAG headquarters, dominate the area and are focal points upon entering the base. The eastern boundary of this zone forms the principle exposure to the neighboring community along Military Road. Chandler Street on the base forms the western border.

Most of the wooden frame structures between the Military Road fence and Porter Street are scheduled for demolition. The demolition of these buildings will open up this space and allow it to serve as the foreground for the administrative buildings. However, Buildings 10, 11, and 12 will be renovated and will be the location of a museum to interpret Fort Detrick's history.

There is no evident architectural theme to unify the image in this zone. It contains a blend of structures dating from pre-WW II to recently constructed buildings. In general, the buildings are clustered together in a linear plan that is congested and presents a cluttered appearance (see Figure 2-1).

Assets

- ① Building 810, the Administrative Headquarters, is a new, two-story, brick and cast stone structure with fixed glazing and sloping metal roof. The building's red brick is of the native variety produced in the Maryland-Virginia region for centuries. The cast stone is gray in color, and roofing and trim are of bronze tones. Because of its size and prominent location, the building is easily identified as the base Administrative Headquarters when viewed from nearby streets.
- ② The parade ground is a valuable, open space and provides a focus for the zone.

Liabilities

- ① No strong, unifying architectural theme is evident in this area as a result of the abundance of building styles.
- ② Buildings are not immediately identifiable by function, other than Building 810.
- ③ Building 810 is surrounded on two sides by one-story, frame, WW II-vintage structures. The long, low, gable-roofed buildings have been retained and adapted to various uses. These buildings contribute to the crowded look. Some of these structures are clad with asbestos shingles, while others retain the original painted wood siding. In most cases, the exteriors are covered by white aluminum siding. Mechanical equipment, transformers, and dumpsters are clearly visible in front of the buildings.
- ④ Building 810's entry has no relationship to the form of the building. Parking in front of the building visually separates the building's entry from the parade ground and the main gate.
- ⑤ Although Building 810's entrance is obvious to visitors, it is not sited on axis with the major streets, nor is it strongly linked to the parade ground. In fact, of all the buildings surrounding the parade ground, only 810 offers any orientation to this open space. The remaining structures fail to focus on or reinforce this attractive asset. The parade ground lacks trees on its north and west edges, which weakens this space visually.
- ⑥ The area along Military Road is junky looking. The buildings along the east side of Porter Street turn their backs on this major intersection with the community. This area should function as the post's front yard and a transition area between the community and Fort Detrick.
- ⑦ The main entry gate lacks distinctive signage, lighting, plantings, and an appropriately scaled entry structure. The gate has a bland and generic appearance.
- ⑧ The location of the entry contributes to the confusing traffic pattern. Traffic stacks at peak periods along Ditto Avenue and Porter Street.

Liabilities (cont.)

- 9 The entry experience does not extend into the post and connect with the parade ground and Headquarters Building, a major focal point within and outside the post.
- 10 There is a lack of hierarchy in the street system. Porter Street and Doughen Drive are not immediately identifiable as major streets within the post.
- 11 Pull-in parking along Porter Street, Schrieder Street, and Doughen Drive gives the street the appearance of an extended parking lot. This type of parking can be dangerous.
- 12 There is a lack of properly sited and well-designed courtyards and plazas within this zone for the enjoyment of the population.
- 13 The street tree plantings are incomplete.
- 14 The selection of plant materials does little to improve the visual quality of the environment. In addition, the plantings require a high level of maintenance.
- 15 There is a lack of variety of plant materials that would provide visual interest year round.
- 16 There is a lack of uniform lighting, signage, and site furnishings, which contributes to the confusing visual quality of this zone.
- 17 Building 660: Handicapped access has been attempted but not successfully provided in accordance with American National Standards Institute (ANSI) regulations; metal entrance canopies provide limited shelter and block light fixtures from illuminating doorways; building lacks a well-defined main entry; window air conditioners are poorly fitted to windows and project onto walkways. Structural glazed tile looks garish and outdated.

Recommendations

General

- Reinforce the parade ground by placement of structures and entrances on axis with the open space.
- Improve entrances and pedestrian access to buildings.
- Remove structures along the east side of Porter Street to create a green buffer zone at the Military Road boundary.
- Remove WW II-vintage, frame structures in the vicinity of Building 810. Restore any of these structures to be retained.
- Eliminate pull-in parking along Porter Street, Doughen Drive, and Schrieder Street.
- Observe an established color palette for masonry and siding in this zone.
- Follow a uniform color scheme for tanks and above-ground utility structures, warehouses, etc.
- Relocate or screen transformers, dumpsters, and mechanical equipment.
- Observe a standard for lighting, signage, and site furnishings.
- Every effort should be made to increase the budget designated for plant maintenance in this highly visible zone, with the realization that without maintenance, plants will not thrive and the time and money invested in them will be wasted. All overgrown and unhealthy plants must be systematically removed, as well as all plants that exist as individual balls. These plants drain the maintenance resources. A survey must be undertaken to identify these plants and plan for their removal. Plants should be chosen with their natural height and form in mind so that pruning will not be required to maintain the desired effect. Plant a wider variety of small, flowering trees and evergreen trees to extend the visual interest.
- Complete the street tree plantings in this zone.

New Buildings

- Virtually all of the buildings comprising the Main Administrative zone are temporary, or at best are semipermanent. The new administration building (Building 810) is the only permanent building in the area. It is consistent with the campus-wide recommended guidelines for new construction. New construction shall be of similar character to Building 810.
- All new construction shall be sited to reinforce the formal character of the administrative zone, with particular attention to its relationship to the parade ground and Building 810.
- Focus new building construction on the parade ground.
- Demolish all temporary and semipermanent buildings and replace them with appropriate new construction that conforms with the overall campus design guidelines.

Existing Buildings

Many of the existing buildings in the Main Administrative zone are slated for demolition in the next five years. Until these buildings are replaced, the following guidelines should be followed for their alteration:

- All buildings shall be made accessible to the handicapped through the use of ramps, rails, and appropriate steps.
- Buildings 10, 11, 12, 115, and 116 have important associations with the post's history. All plans or changes that will effect these buildings must be reviewed by the planning department. Ideally, these buildings should be returned to their original exterior appearance.
- Hamilton Street (the Airport Tarmac Strip) must be protected. Parking should be removed from this area and a sign explaining its historic significance installed. No cuts are allowed in the pavement.
- Pressure-treated wood construction shall not be allowed to remain exposed; such construction shall be stained or painted as soon as the wood has weathered sufficiently to allow coatings to be applied. The use of wood lattice shall be avoided for all purposes except for the screening of foundation spaces under porches and temporary buildings. The existing lattice at the drive-up to Building 718 should

be removed, because it only contributes to that building's temporary and insubstantial appearance.

Building 660

- Provide handicapped access ramps that conform with ANSI regulations.
- Provide permanent, covered entry porches with integrated lighting, emphasizing the main entry over secondary entries.
- Relocate the window air conditioners or provide split-system units with remote compressors.
- Move the walkway away from the buildings and provide foundation plantings (see Figure 2-2).

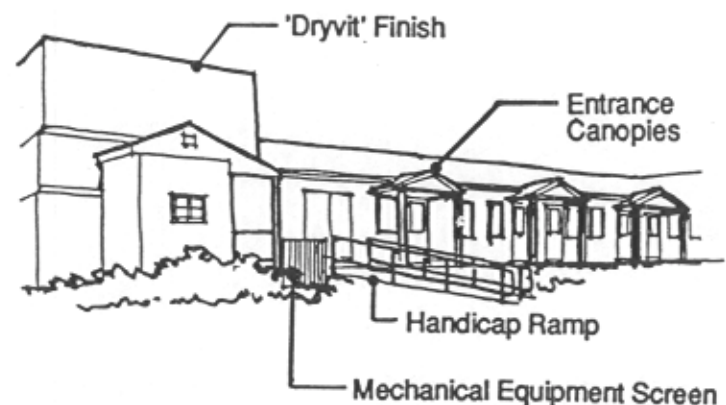


Figure 2-2: Recommendations for Building 660

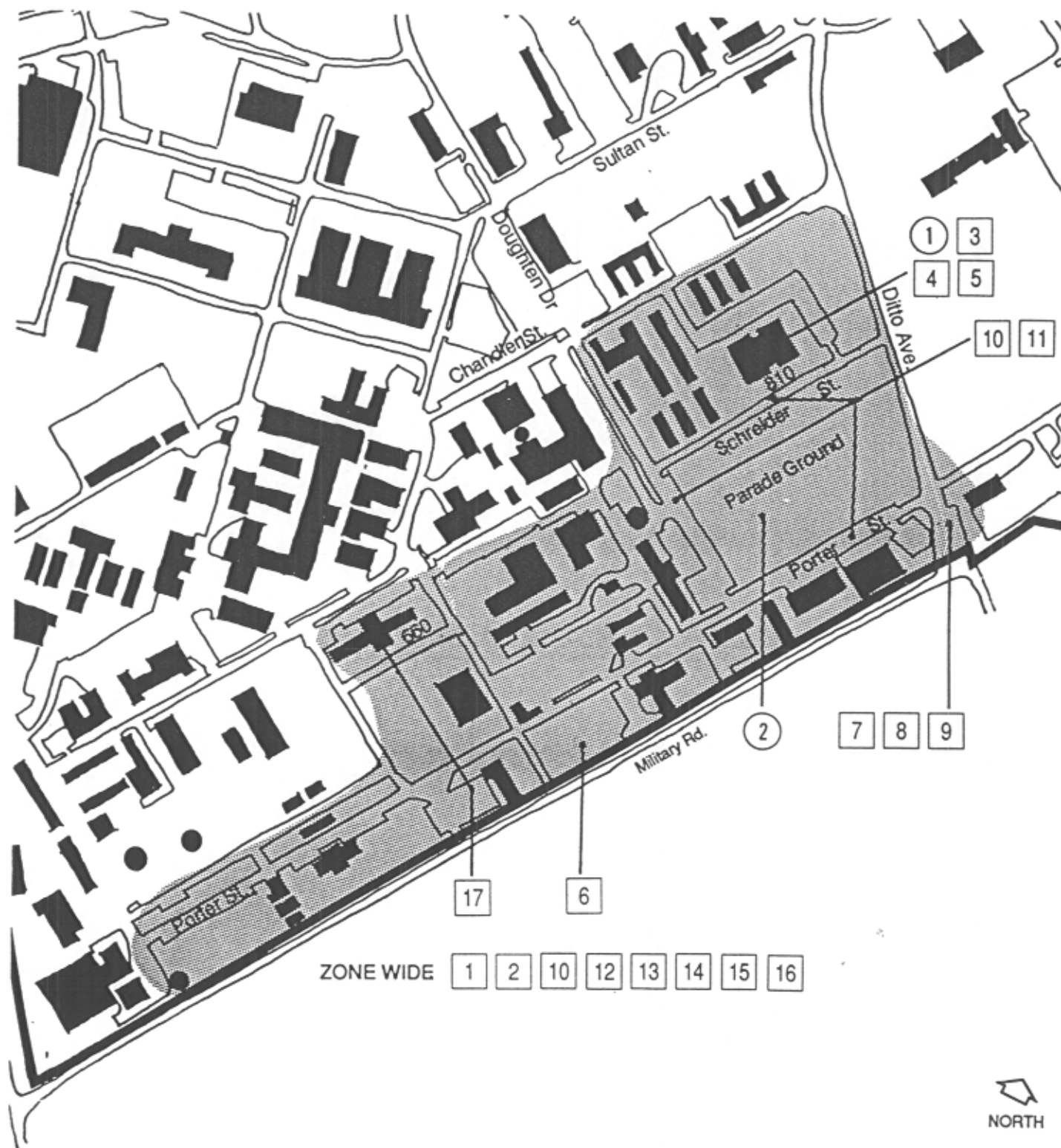
INTRODUCTION

This section presents information specific to each of the visual zones. A general description and list of the assets and liabilities, keyed to a site map, are given for each zone. Recommendations are also given. This list of recommendations is not prioritized, because they all are

important and interdependent. These recommendations should be consulted during the planning process to help direct budgetary and administrative actions.

VISUAL ZONES

Figure 2-1: Main Administrative Zone, Assets and Liabilities



Note: Refer to Text for Description of Assets & Liabilities.

MAIN ADMINISTRATIVE ZONE

The Main Administrative Zone is located along the Military Road boundary. Its visually prominent location does not, at the present time, contribute to a strong visual image of the post.

The Main Administrative Zone is located directly inside Fort Detrick's main gate at the Seventh Street entrance. The parade ground and Building 810, the USAG headquarters, dominate the area and are focal points upon entering the base. The eastern boundary of this zone forms the principle exposure to the neighboring community along Military Road. Chandler Street on the base forms the western border.

Most of the wooden frame structures between the Military Road fence and Porter Street are scheduled for demolition. The demolition of these buildings will open up this space and allow it to serve as the foreground for the administrative buildings. However, Buildings 10, 11, and 12 will be renovated and will be the location of a museum to interpret Fort Detrick's history.

There is no evident architectural theme to unify the image in this zone. It contains a blend of structures dating from pre-WW II to recently constructed buildings. In general, the buildings are clustered together in a linear plan that is congested and presents a cluttered appearance (see Figure 2-1).

Assets

- ① Building 810, the Administrative Headquarters, is a new, two-story, brick and cast stone structure with fixed glazing and sloping metal roof. The building's red brick is of the native variety produced in the Maryland-Virginia region for centuries. The cast stone is gray in color, and roofing and trim are of bronze tones. Because of its size and prominent location, the building is easily identified as the base Administrative Headquarters when viewed from nearby streets.
- ② The parade ground is a valuable, open space and provides a focus for the zone.

Liabilities

- ① No strong, unifying architectural theme is evident in this area as a result of the abundance of building styles.
- ② Buildings are not immediately identifiable by function, other than Building 810.
- ③ Building 810 is surrounded on two sides by one-story, frame, WW II-vintage structures. The long, low, gable-roofed buildings have been retained and adapted to various uses. These buildings contribute to the crowded look. Some of these structures are clad with asbestos shingles, while others retain the original painted wood siding. In most cases, the exteriors are covered by white aluminum siding. Mechanical equipment, transformers, and dumpsters are clearly visible in front of the buildings.
- ④ Building 810's entry has no relationship to the form of the building. Parking in front of the building visually separates the building's entry from the parade ground and the main gate.
- ⑤ Although Building 810's entrance is obvious to visitors, it is not sited on axis with the major streets, nor is it strongly linked to the parade ground. In fact, of all the buildings surrounding the parade ground, only 810 offers any orientation to this open space. The remaining structures fail to focus on or reinforce this attractive asset. The parade ground lacks trees on its north and west edges, which weakens this space visually.
- ⑥ The area along Military Road is junky looking. The buildings along the east side of Porter Street turn their backs on this major intersection with the community. This area should function as the post's front yard and a transition area between the community and Fort Detrick.
- ⑦ The main entry gate lacks distinctive signage, lighting, plantings, and an appropriately scaled entry structure. The gate has a bland and generic appearance.
- ⑧ The location of the entry contributes to the confusing traffic pattern. Traffic stacks at peak periods along Ditto Avenue and Porter Street.

Liabilities (cont.)

- 9 The entry experience does not extend into the post and connect with the parade ground and Headquarters Building, a major focal point within and outside the post.
- 10 There is a lack of hierarchy in the street system. Porter Street and Doughen Drive are not immediately identifiable as major streets within the post.
- 11 Pull-in parking along Porter Street, Schrieder Street, and Doughen Drive gives the street the appearance of an extended parking lot. This type of parking can be dangerous.
- 12 There is a lack of properly sited and well-designed courtyards and plazas within this zone for the enjoyment of the population.
- 13 The street tree plantings are incomplete.
- 14 The selection of plant materials does little to improve the visual quality of the environment. In addition, the plantings require a high level of maintenance.
- 15 There is a lack of variety of plant materials that would provide visual interest year round.
- 16 There is a lack of uniform lighting, signage, and site furnishings, which contributes to the confusing visual quality of this zone.
- 17 Building 660: Handicapped access has been attempted but not successfully provided in accordance with American National Standards Institute (ANSI) regulations; metal entrance canopies provide limited shelter and block light fixtures from illuminating doorways; building lacks a well-defined main entry; window air conditioners are poorly fitted to windows and project onto walkways. Structural glazed tile looks garish and outdated.

Recommendations

General

- Reinforce the parade ground by placement of structures and entrances on axis with the open space.
- Improve entrances and pedestrian access to buildings.
- Remove structures along the east side of Porter Street to create a green buffer zone at the Military Road boundary.
- Remove WW II-vintage, frame structures in the vicinity of Building 810. Restore any of these structures to be retained.
- Eliminate pull-in parking along Porter Street, Doughen Drive, and Schrieder Street.
- Observe an established color palette for masonry and siding in this zone.
- Follow a uniform color scheme for tanks and above-ground utility structures, warehouses, etc.
- Relocate or screen transformers, dumpsters, and mechanical equipment.
- Observe a standard for lighting, signage, and site furnishings.
- Every effort should be made to increase the budget designated for plant maintenance in this highly visible zone, with the realization that without maintenance, plants will not thrive and the time and money invested in them will be wasted. All overgrown and unhealthy plants must be systematically removed, as well as all plants that exist as individual balls. These plants drain the maintenance resources. A survey must be undertaken to identify these plants and plan for their removal. Plants should be chosen with their natural height and form in mind so that pruning will not be required to maintain the desired effect. Plant a wider variety of small, flowering trees and evergreen trees to extend the visual interest.
- Complete the street tree plantings in this zone.

New Buildings

- Virtually all of the buildings comprising the Main Administrative zone are temporary, or at best are semipermanent. The new administration building (Building 810) is the only permanent building in the area. It is consistent with the campus-wide recommended guidelines for new construction. New construction shall be of similar character to Building 810.
- All new construction shall be sited to reinforce the formal character of the administrative zone, with particular attention to its relationship to the parade ground and Building 810.
- Focus new building construction on the parade ground.
- Demolish all temporary and semipermanent buildings and replace them with appropriate new construction that conforms with the overall campus design guidelines.

Existing Buildings

Many of the existing buildings in the Main Administrative zone are slated for demolition in the next five years. Until these buildings are replaced, the following guidelines should be followed for their alteration:

- All buildings shall be made accessible to the handicapped through the use of ramps, rails, and appropriate steps.
- Buildings 10, 11, 12, 115, and 116 have important associations with the post's history. All plans or changes that will effect these buildings must be reviewed by the planning department. Ideally, these buildings should be returned to their original exterior appearance.
- Hamilton Street (the Airport Tarmac Strip) must be protected. Parking should be removed from this area and a sign explaining its historic significance installed. No cuts are allowed in the pavement.
- Pressure-treated wood construction shall not be allowed to remain exposed; such construction shall be stained or painted as soon as the wood has weathered sufficiently to allow coatings to be applied. The use of wood lattice shall be avoided for all purposes except for the screening of foundation spaces under porches and temporary buildings. The existing lattice at the drive-up to Building 718 should

be removed, because it only contributes to that building's temporary and insubstantial appearance.

Building 660

- Provide handicapped access ramps that conform with ANSI regulations.
- Provide permanent, covered entry porches with integrated lighting, emphasizing the main entry over secondary entries.
- Relocate the window air conditioners or provide split-system units with remote compressors.
- Move the walkway away from the buildings and provide foundation plantings (see Figure 2-2).

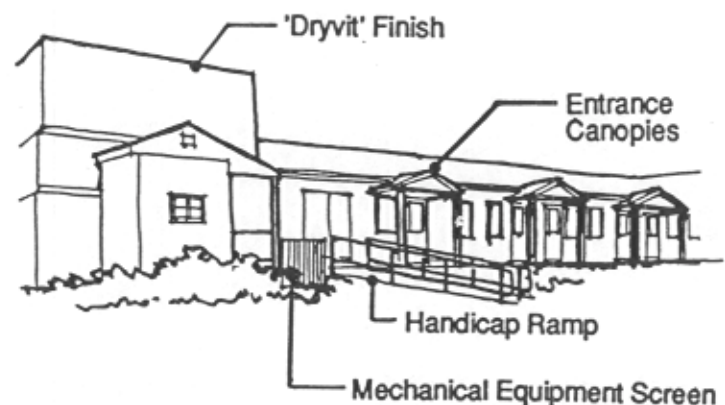


Figure 2-2: Recommendations for Building 660

CONCLUSIONS

After completing the inventory and analysis at Fort Detrick, the post was divided into 11 zones. These zones are used as an organizational tool throughout the IDG and were designated based on shared land use and visual characteristics within the zone. Within zones, there are similar needs in relation to the exterior environment such as architectural style, outdoor spaces, parking, etc. Figure 1-9 presents the visual zones. The IDG focuses its recommendations on the built environment. However, there are areas at Fort Detrick that are not part of this built environment and have not been assigned to a visual zone.

Areas that are not designated as a particular visual zone consist of open space. These open space areas generally contain few structures and roads. However, they serve a variety of needs related to recreation, research, and agricultural at Fort Detrick. In addition, the *Fort Detrick Master Plan Phases I and II (1984)* specifies some of these areas for future expansion.

Visual Zones

- Main Administrative Zone
- 1110th Signal Battalion Zone
- FLAIR Armory Zone
- NCI Zone
- USAMRIID Zone
- USDA Zone
- Personnel Support Zone
- Family Housing Zone
- Nallin Farm Zone
- Industrial Zone
- Warehouse Zone

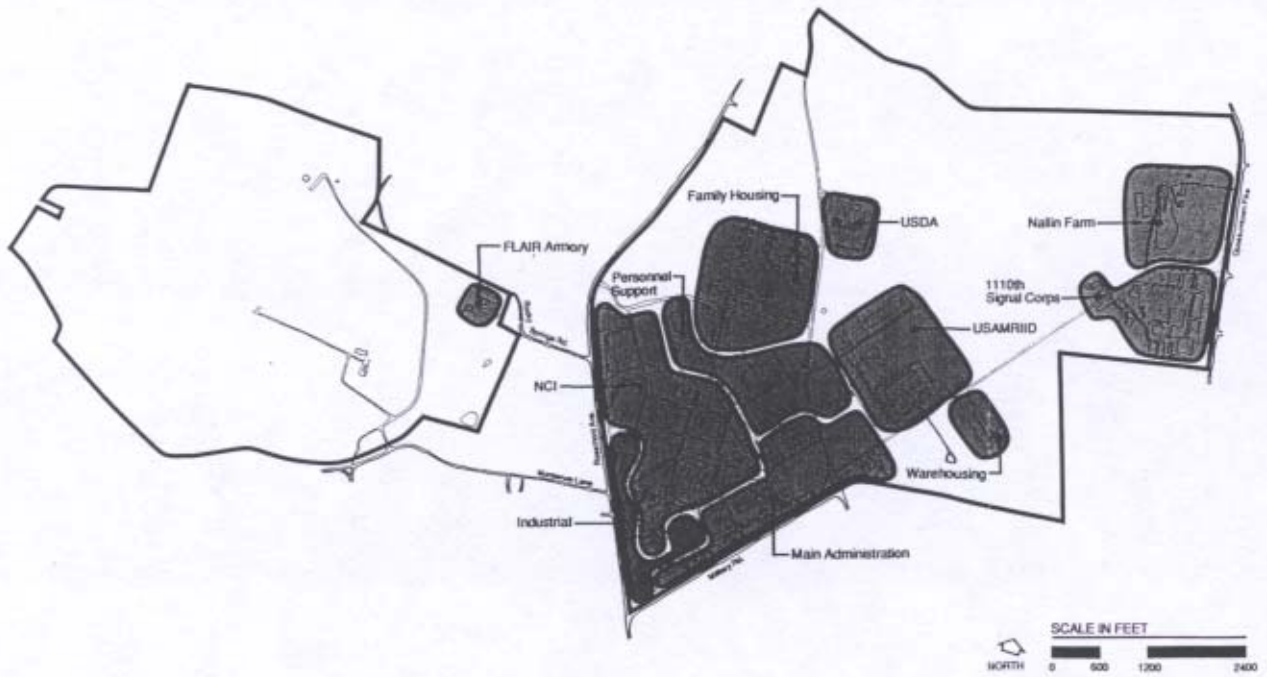
IDG Theme

The overall goals of the IDG are as follows:

- Project an image of Fort Detrick as an outstanding biomedical R&D center and provide the physical environment that reflects this image.
- Organize the visual environment.
- Strengthen the perception and functioning of the "community" at Fort Detrick. In many ways, the post is a small city. The IDG should provide for the development of amenities and strengthen connections between the various districts of the community.

BACKGROUND

Figure 1-9c Visual Zones



BACKGROUND

INVENTORY AND ANALYSIS OF EXISTING CONDITIONS

The following is a discussion of the results of the survey of the existing conditions at Fort Detrick and how they affect the individual components of the exterior environment. The assets and liabilities are summarized and the needs for each area are identified.

BOUNDARIES

The boundaries are the first and often the only contact people have with Fort Detrick (see Figure 1-3). They establish the visual image as it is perceived by the surrounding community. These areas reflect the character of the base and are a visual interface with the surrounding communities. The boundaries receive the greatest public exposure and possess the potential to become a powerful means of projecting an accurate image of Fort Detrick today. These areas also need to visually define the separation of Fort Detrick from the surrounding Frederick community. Although the ideal visual image is compatible with the community, the separate identity of the Fort Detrick community needs to be established.

Military Road Boundary

The boundary area along Military Road presents an image that is in sharp contrast to the low-density, single-family housing area of the adjacent community. The boundary line is defined by chain-link fencing whose utilitarian character is inappropriate to this area. This type of fencing is fairly transparent. Not only does it poorly define the edge of Detrick, it also allows what is behind the fence to be seen, and this is perceived as part of the boundary. This edge is cluttered with WW II temporary buildings whose backyards face Military Road.

This edge should function as a transition area between the community and Fort Detrick. It should be an open green space that defines the edge of the post, and it should also be compatible with the houses across the street and the general environment of the area. This area should also be the front yard for the main group of administrative buildings located on the west side of Porter Street.

The development of the Military Road boundary is a long-term project made up of several phases. Refer to the *Fort*



Figure 1-3: Boundaries

Detrick Project Documentation document for a more detailed description of this project.

Rosemont Avenue Boundary

The boundary area along Rosemont Avenue presents a raw, industrial image to the community. This area is visually very confusing with the combination of above-ground steam lines, overhead wires, industrial buildings, and highly visible storage areas. The image presented in this area contributes to the confusion surrounding the activities and mission of Fort Detrick. This area does not appear to be a major medical research and development center to the many people who drive along Rosemont Avenue. However, the area directly across the street also presents a visually confusing image. The development along Rosemont Avenue is mainly commercial and is comprised of fast food restaurants and carry-out grocery stores and a strip shopping center, all of which are directly visible from Fort Detrick. The Rosemont Avenue entry gate is located in this boundary area. In addition, there is an entry gate farther up Rosemont Avenue that is no longer active. The ambiguity of an obvious entry that is unused and shabby looking detracts from the visual image along this edge. This edge should present a more visually organized view to the public. Since it is not practical to relocate many of the industrial uses, they should appear well maintained and contribute to, rather than detract from, the overall image of Fort Detrick as a state-of-the-art research and development center.

Opossumtown Pike Boundary

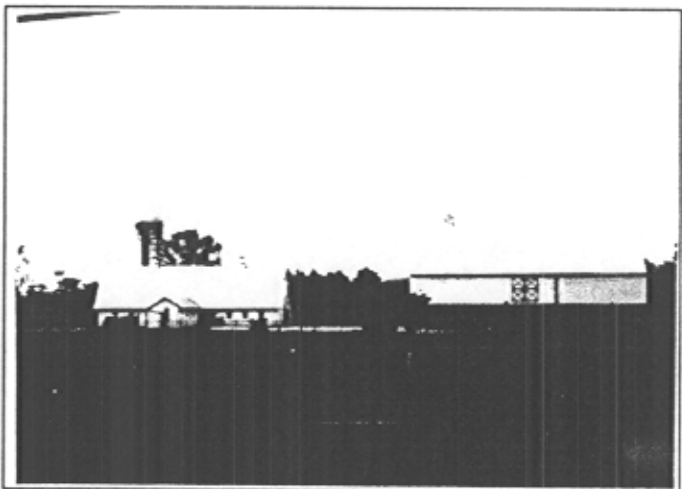
The boundary area along Opossumtown Pike borders the Nallin Farm and the 1110th Signal Division Zone. The area across Opossumtown Pike is mainly multifamily housing that has a definite landscape setback from the road. The Nallin Farm buildings are also set back from the road, presenting a pleasant, pastoral scene. The visual scenes on both sides of the street are compatible. The problems associated with this particular boundary are the large, unattractive parking lot in front of the 1110th Signal Division Headquarters and the seemingly unnecessary double row of fencing in front of the Nallin Farm area. There is a locked gate at the entry drive of the Nallin Farm House. This area is further denoted by an alley of trees along the drive. This entry should be maintained even if it is not used on a regular basis. This boundary presents a pleasant, pastoral scene to passersby and should be maintained in its present condition as a farm.



Military Road Boundary



Rosemont Avenue Boundary



Opossumtown Pike Boundary

BACKGROUND

Eastern Boundary

This area borders both single family and multifamily residential developments. This edge of Fort Detrick lacks sufficient definition. There are large, open fields and the boundary line is marked by a metal chain-link fence. The fence is rather transparent and does not visually define the edge of the base. A tree-planting border is needed to define the edge more clearly and to buffer the surrounding residential communities. See the *Fort Detrick Project Documentation* document for more details.

Area B Boundary

The edge of Area B consists of a simple metal fence. Since the surrounding community is comprised of single-family housing in a rural setting, the unobtrusive nature of this boundary is appropriate to the surrounding visual scene. This visual quality must be maintained.

ENTRIES

There are three entries to the main facility — the Main Gate, the Rosemont Avenue Gate, and the Opossumtown Pike Gate. In addition, there are two entries that are not used on a regular basis; one on Rosemont Avenue and one at the Nallin Farm. There is one entrance to Area B located on Montevue Lane (see Figure 1-4). The entries are a transition from the community into Fort Detrick and should announce this fact visually. They should be immediately recognizable as a gateway into the facility.

Main Gate

The main entry, located at the intersection of 7th Avenue and Military Road, is used by staff, residents, and visitors. This is the first impression of the facility. It is the only gate that visitors may enter. Its location next to the main administrative area also gives it added prominence. Unfortunately, this entry has a bland, generic appearance. The lack of distinctive signage, lighting, plantings, and an appropriately scaled entry structure contribute to the lack of any real sense of arrival to Fort Detrick that this entry should provide. This area has a

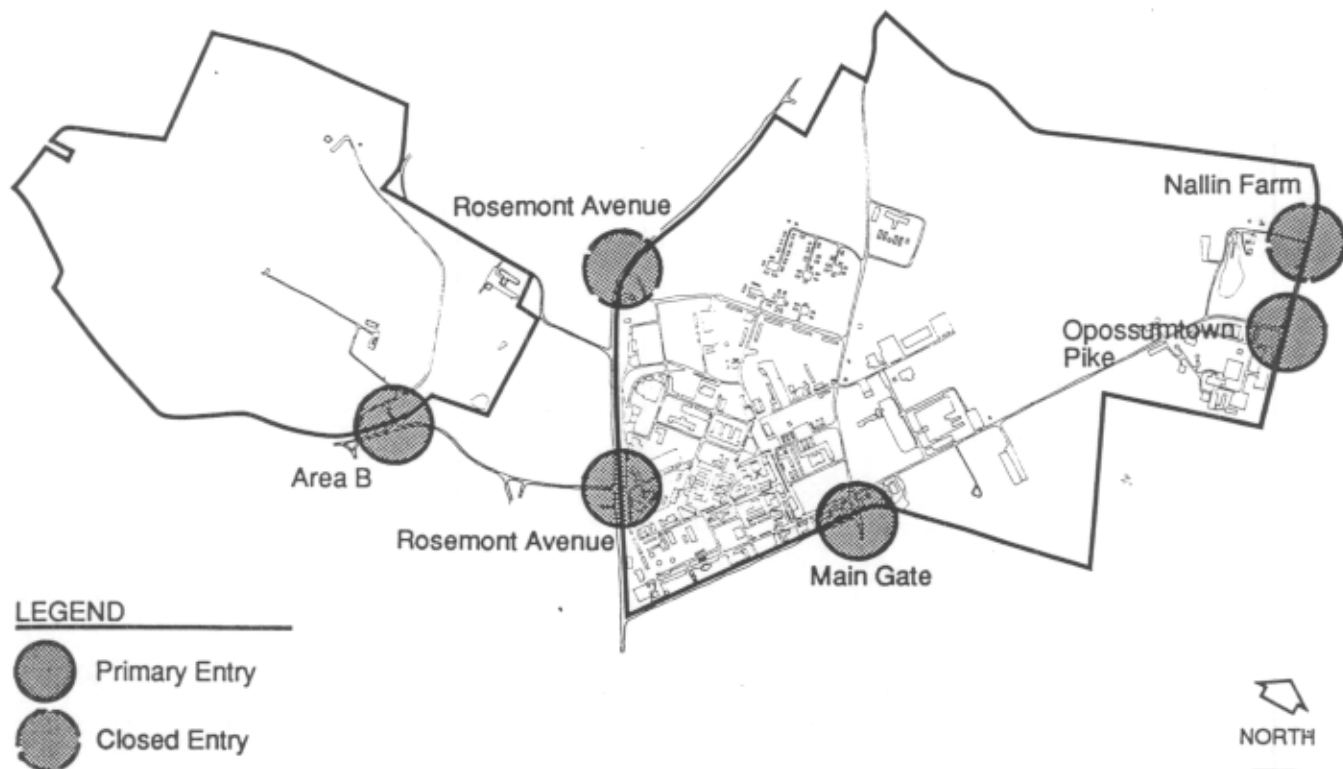
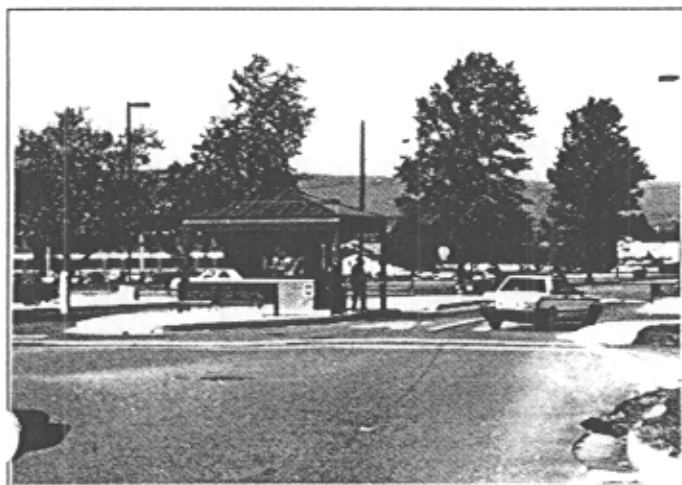


Figure 1-4: Entries

great deal of potential to project a positive image. Currently, it does not live up to its potential as the gateway to a major medical research campus.

The entry experience does not extend into the post and connect with the parade ground and the Headquarters Building 810, a major focal point both within and outside the post. The location of the entry and the confusing traffic pattern created at this point contribute to this effect.



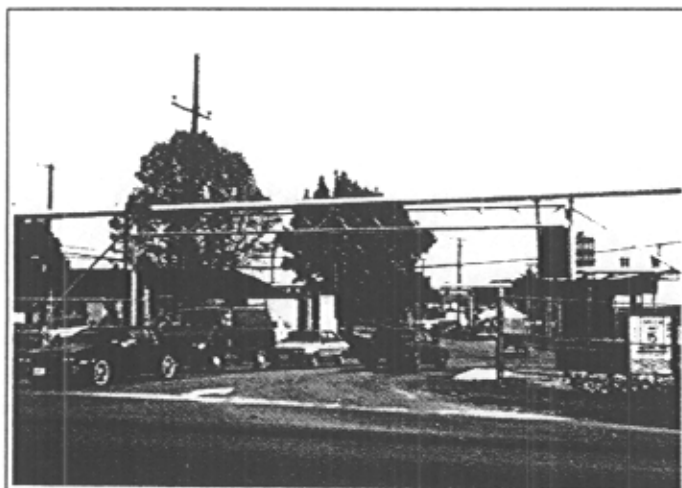
Main Gate

Rosemont Avenue Gate

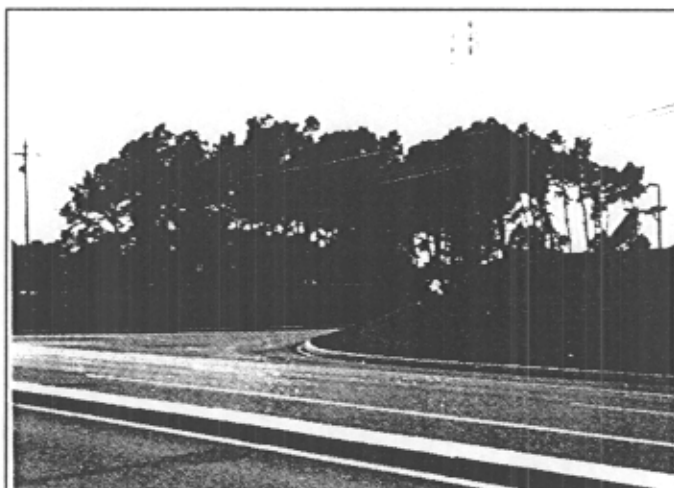
The Rosemont Avenue Gate is located at the intersection of Ware Drive and Rosemont Avenue. It is used by staff and residents, and although it is not as prominent as the Main Gate, it still is an important access point to the post. The current image is industrial and chaotic. The various utility lines, storage areas, and industrial buildings along the boundary also impact the entry. The traffic pattern at this gate functions very poorly, resulting in stacked traffic at peak times such as lunch and closing. There are no signs identifying this gate as an entry to Fort Detrick. Improving the appearance along the Rosemont Avenue boundary will greatly improve the appearance of this gate.

Opossumtown Pike Gate

This entry is used by staff and residents, but is not open to visitors. With the recent widening of Opossumtown Pike, the entry gate to this side of the post was moved from its original location, in front of the 1110th Signal Division Headquarters, to align with Porter Street. This entry is not visible from Opossumtown Pike because of the lack of signage and its recessed location between two hills. The overall image at this entrance is nondescript. There is no sign and the entry is not identified as being to Fort Detrick.



Rosemont Avenue Gate

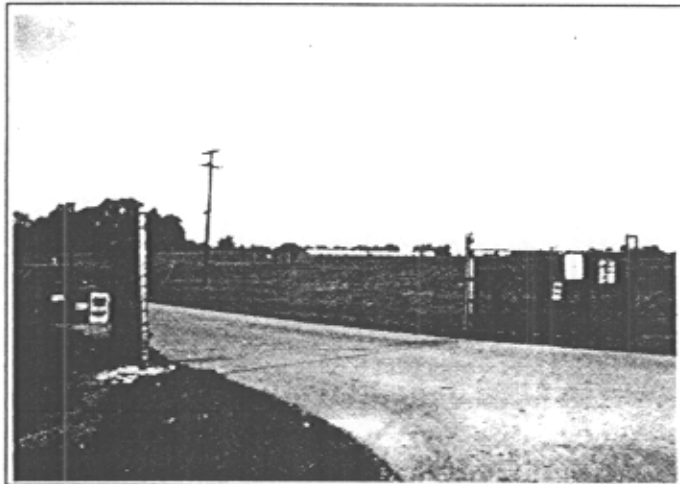


Opossumtown Pike Gate

BACKGROUND

Area B Gate

The entry to Area B is a metal gate. This simple entry is appropriate to the rural, agrarian image of this area. However, a sign is needed to identify this area as a part of Fort Detrick.



Area B Gate

Other problems associated with the street system include the lack of visual hierarchy for primary, secondary, and tertiary roads. It is not apparent which are the most important, from either the width or the appearance of the various streets. Primary roads should connect major activity centers within an installation, and should have controlled access, a minimum number of curb cuts, and alignments that promote continuous traffic flow. The primary streets at Fort Detrick, often violate these principles. Doughten Drive, Ditto Avenue, and Porter Avenue were designated as primary streets by the master plan. Doughten Drive and Ditto Avenue terminate ambiguously; Doughten ends in the housing area; and Ditto is cut off abruptly by the chain link fence across the road. The hierarchy of the streets needs to be more clearly defined. There is on-street parking on both Porter and Doughten. This gives the street an appearance of being a parking lot and allows the automobile to become the dominant visual element.

There are several smaller streets that should be closed in the Main Administrative and NCI zones. These streets were created during WW II to serve the temporary barracks. However, they remain and add to the confusion and traffic pattern problems within the post. Many of the proposals in the *Landscape Master Plan* address this and should be implemented in conjunction with additional IDG guidelines.

CIRCULATION

Streets

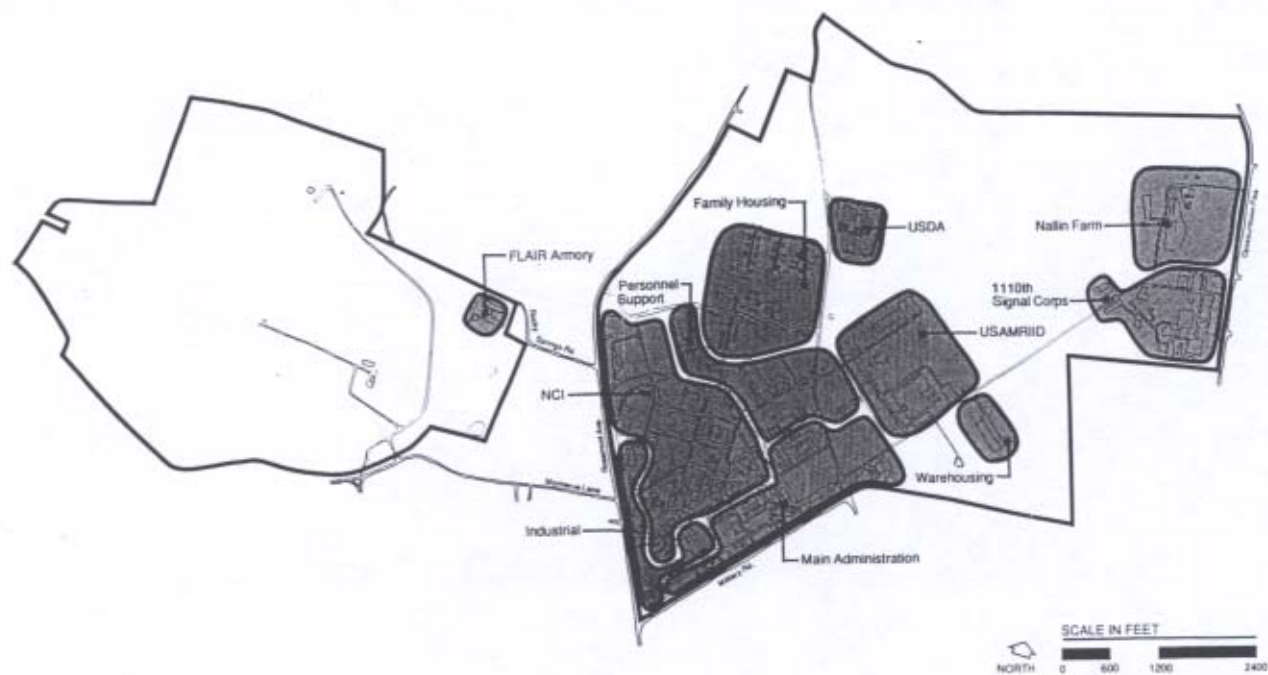
The streets, and to a lesser extent the sidewalks, are the vantage point from which people view the exterior environment. In this way, the streets control the perception of the buildings and site. In addition, the streets form the spatial pattern of the site, controlling the siting of individual buildings and their relation to each other. The major problems with the circulation system at Fort Detrick are the lack of hierarchy in the streets and confusing street layouts (see Figure 1-5).

The street system on the main post consists of two separate grid patterns. The intersection of these two along Doughten Drive prevents a smooth traffic flow and is visually confusing. In the NCI district, the grid pattern of the streets has been skewed. This has resulted in street intersections at odd angles and awkward building sitings.

Pedestrian

The pedestrian system, which consists primarily of sidewalks, is incomplete. The sidewalks end abruptly in many cases, such as along Sultan Drive across from Buildings 1423 and 1425. In other cases, the lack of sidewalks isolates one area from another. This is the case with the lack of sidewalks along Ditto Avenue all the way out to the USDA zone. Sidewalks must be provided along all streets. There must also be internal connections between major destination points within zones. The intersections of the pedestrian system and the roads, such as crosswalks, need to be designated in an obvious and consistent way. At present, the crosswalks are designated by painting strips that in many cases are worn or not obvious. A pedestrian circulation system is needed to provide a safe means of travel for the people who work and live on Fort Detrick. The sense of connection between the various zones, provided by sidewalks, promotes the perception of Fort Detrick as a community. Handicapped access must be incorporated into the pedestrian circulation system.

Figure 5: Visual Zones



A new jogging trail system was installed in the fall of 1989 (see Figure 1-6). This series of paths consists of new trails to supplement the existing sidewalks and perimeter roads. The trail has a series of loops of varying lengths — 5.1, 4.1, and 3.1 miles. These jogging trails may also be utilized for other pedestrian activities such as biking and walking.

Parking

There is a great demand for parking spaces at Fort Detrick, because the majority of the post's employees drive to work. In addition, there are the residents of Family Housing and the bachelor quarters, as well as visitors to the post. This results not only in a large demand for parking spaces at the fort, but also in the need for parking for a variety of situations: all-day parking must be provided for employees within a reasonable distance from the buildings in which they work; short-term parking is required for visitors near the entries to the main facilities they frequent; and finally, parking areas are needed in the Family Housing zone that are appropriate in scale and image to this setting.

The current parking lots are, for the most part, large, unbroken expanses of paving. They do not contain planting islands or other means of integrating the lots into the surrounding landscape. They often do not relate well to the sitings of the buildings they are serving and do not have paths tying them to the entries. The overall result of the parking situation is that these large parking lots dominate the surrounding visual scene.

Pull-in parking areas are both a safety and visual conflict. The situation exists along the eastern portion of Porter Street, on Schrieder Street, and in the Family Housing zone. The street is viewed as an extension of the parking lot. This confusion with parking and roads also exists in the NCI area.

Several smaller "streets" are actually driveways into parking lots. Fraim and Palacky Streets are examples of this situation. The distinction between parking areas and through streets needs to be clearly delineated.

The unplanned growth at Fort Detrick is expressed very clearly in the parking areas. Parking lots are provided next to new buildings, while old lots remain and often are underused. This gives the impression that cars are everywhere. They dominate the visual environment. Cars are a fact of daily life at Detrick and must be accommodated in the landscape. However, this does not mean that they must dominate the view or control the decisions that are made concerning the total exterior environment.

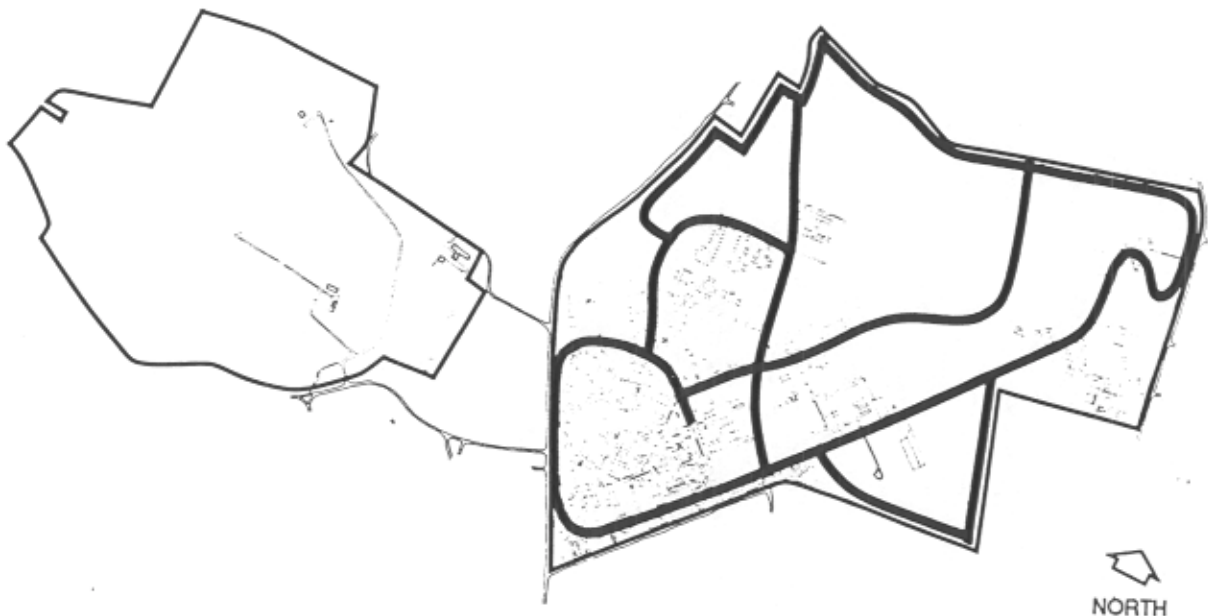


Figure 1-6: Jogging Trails

BACKGROUND

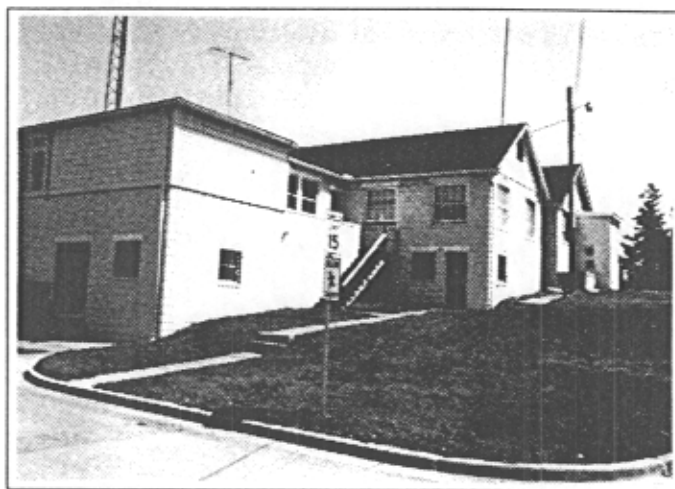
ARCHITECTURE

There is a wide range of building styles at Fort Detrick that bear little relation to each other. As a result, there is no predominant Fort Detrick architectural theme. The existing situation detracts from the visual environment. The most consistent theme on the post is that of relatively large, two-story buildings with red brick exteriors and pitched roof surfaces. The following are descriptions of the main types of buildings found on the post.

Type A

Semi-Permanent Concrete Block Buildings

Type A buildings are characterized by the use of formed, bevelled concrete blocks for the exterior walls, with pitched, asphalt shingle roofs. Trim and gables are usually of wood construction. These buildings are typically one- or two-stories high, with large, steel sash windows. The overall style of these buildings is reminiscent of Frederick county farm utility buildings from the 1930s and 1940s. Building 10 is a typical example of a Type A Building.

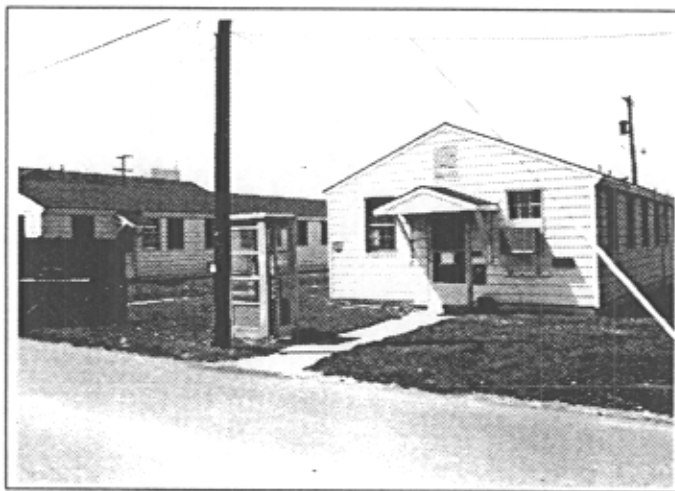


Building 10

Type B

Temporary Frame Barracks

Type B buildings are gradually vanishing from Fort Detrick, as they have exceeded their intended lifespan by as much as forty years. These buildings are light, one- and two-story frame buildings with pitched roofs. These were originally clad with wood clapboards which have given way to asbestos shingles and aluminum siding. Windows are typically double-hung wood units. Building 801 is a Type B building.

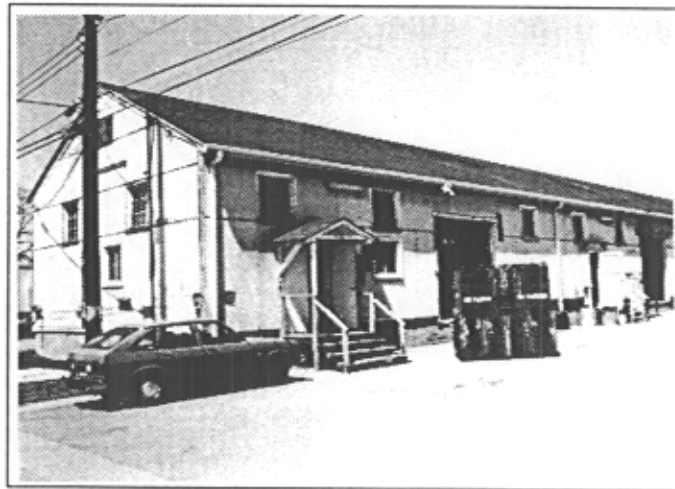


Building 801

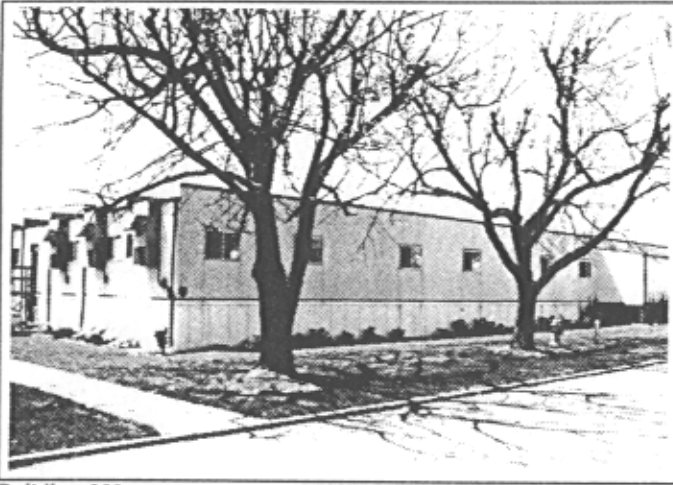
Type C

Temporary Utility Buildings

Type C buildings also are disappearing. These buildings are one-story, industrial or service buildings that serve as warehouses, repair shops, and athletic facilities. These buildings have low-pitched roofs and a variety of wood and steel sash windows. Siding is asbestos composition panels. Nearly all of these buildings are outmoded and in poor condition, and are slated for replacement in the coming years. Buildings 660 and 838 are Typical Type C buildings.



Building 660

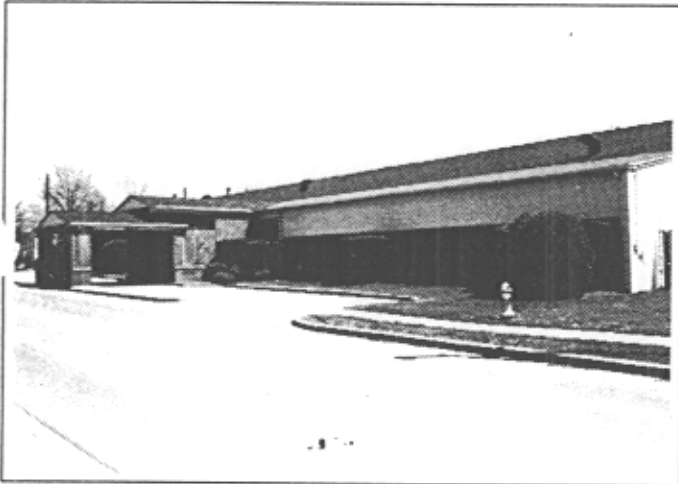


Building 662

Type D

Temporary Modular Units

Type D buildings are mobile, office, trailer units that are set on elevated bases. These units can be joined together to form relatively large buildings, but are temporary in nature and can be removed from the site in a short period of time. Exterior skins are metal panels with sliding, aluminum windows. Air conditioning units are mounted on the ends of the individual units. Building 662 is a typical Type D building.

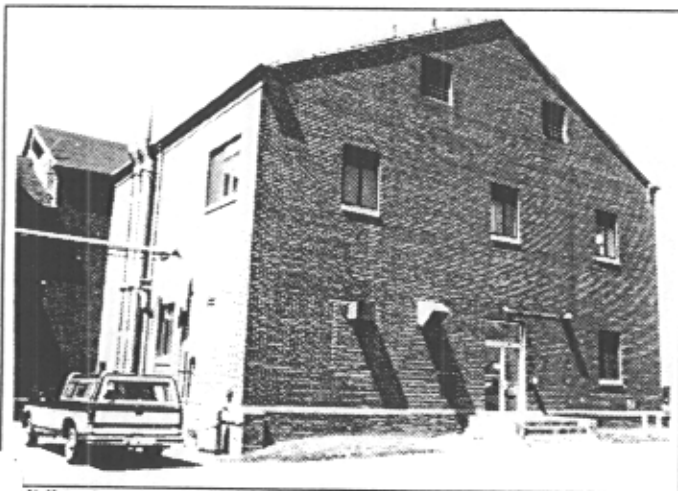


Building 718

Type E

Semi-Permanent Community Buildings

Type E buildings have a variety of forms, materials, and functions, but are characterized by one-story construction with pitched roofs and plain facades. These buildings are larger than the temporary barracks that are their contemporaries. All have sloping, asphalt shingle roofs and may be clad in siding or concrete block with wood trim. Where windows exist, they are typically wood double-hung units. Building 718 is an example of a Type E building.



Building 568

Type F

Masonry Laboratory Buildings

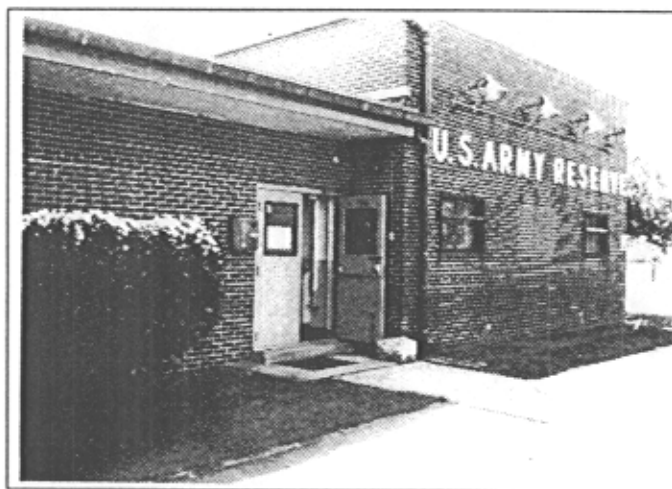
Type F buildings are the most typical permanent structures at Fort Detrick. They are characterized by long, symmetrical, two-story facades, pitched roofs, and one or more cross gables facing the street. Windows are simple metal sashes set in regularly spaced punched openings. Main entrances are centered in the facades. Most Type F buildings are clad in red brick. Buildings 568, 538, 560, and 1301 are examples of Type F buildings.

BACKGROUND

Type G

Masonry Process and Industrial Buildings

Type G buildings are contemporary with Type F buildings and share many details; some are connected to Type F buildings. Type G buildings are large and irregular in plan, with flat roofs. The most prominent Type G buildings at Fort Detrick are the six-story, pilot plant building, its annexes, and the power plant. FLAIR Armory is different in use but similar in character, form, and materials.

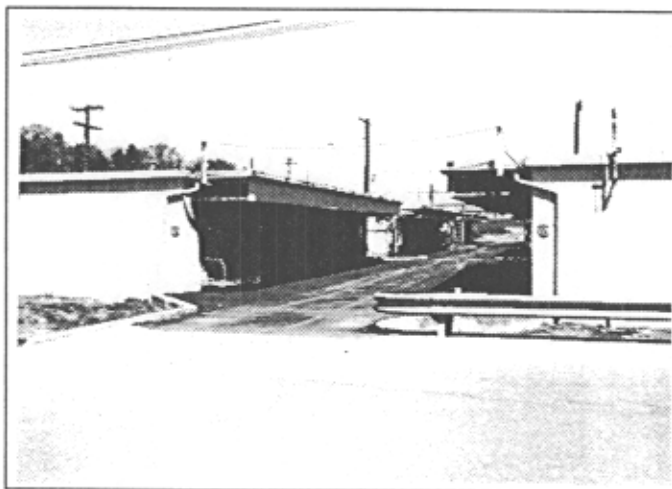


FLAIR Armory

Type H

Animal Facilities

Type H buildings are associated with animal facilities, and are characterized by one-story, masonry construction with deep, roof overhangs shading the front elevations. Most of these buildings have been refinished with a Dryvit stucco system. Building 1029 is an example of a Type H building.



Building 1029

Type I

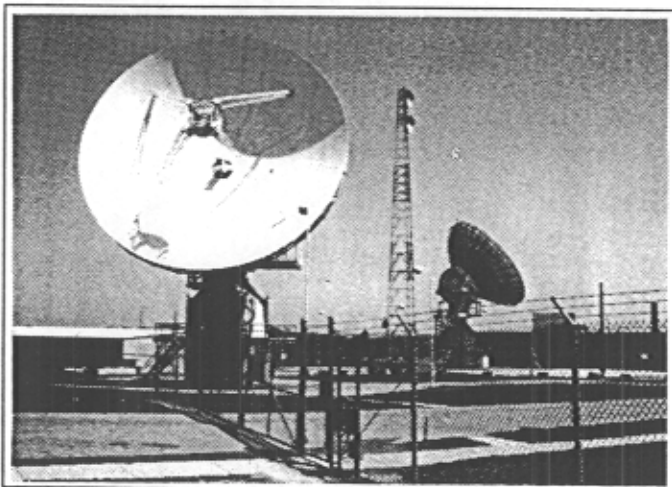
Pre-engineered Metal Utility Buildings

Type I buildings are metal-skinned, pre-engineered buildings, typically used as storage and service facilities. The satellite communications facility service buildings are Type I buildings. Building 1650 is an example of a Type I building.

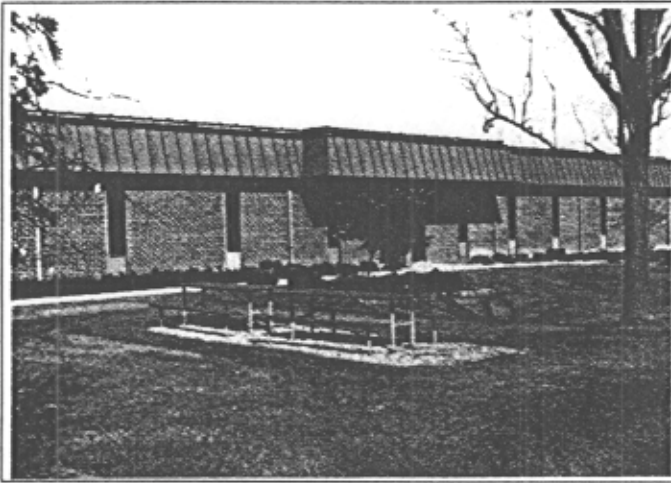
Type J

Pre-engineered Office Buildings

Type J buildings are also pre-engineered buildings, but with masonry veneer finishes for use as offices. Building 1423 is a Type J building.



Building 1650



Building 1423



Building 1425



Building 949

Type K

Large Operations Buildings

Type K buildings are very large, specialized buildings with few windows and precast concrete or masonry exterior finishes. These buildings house sensitive tenants and processes requiring large floor areas and close control of the interior environment. Roofs are flat and building volumes are simply massed. Buildings 1425 and 1672 are Type K buildings.

Type L

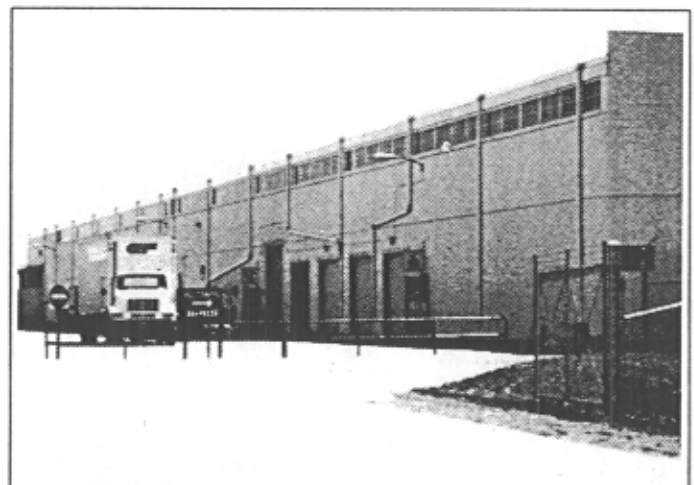
Modern Administration and Support Buildings

Type L buildings are recently constructed office, service, and personnel support buildings, and are characterized by pitched roofs, masonry exteriors, and an overall postmodern design influence. This style is being encouraged for future buildings at Fort Detrick. Buildings 426, 549, 810, and 949 are Type L buildings.

Type M

Masonry Industrial Buildings

Type M buildings are miscellaneous concrete masonry and glazed structural clay tile industrial buildings. These are usually one or two stories, with few windows, and flat roofs. Building 1520 and 263 are a Type M buildings.



Building 1520

BACKGROUND

Type N

Family Housing

Multiple-unit family housing may be divided into four classes.

Type N-1 Duplex Townhouse Units

These units are grouped in attached pairs, with exteriors of masonry and composition siding. Buildings similar to Building 1824 are Type N-1 units.

Type N-2 Attached Wood Frame Townhouse Units

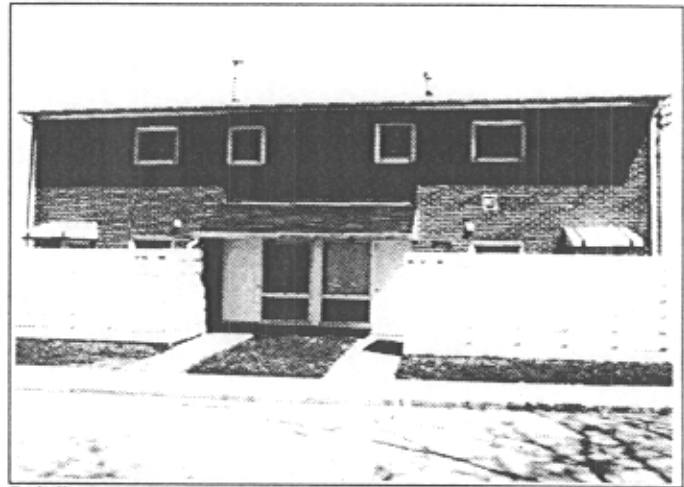
Type N-2 units are arranged in long attached rows. Most of these units have had new aluminum siding applied. Some similar single-family units exist as well. Buildings similar to Building 1016 are Type N-2 units.

Type N-3 Attached Masonry Townhouse Units

These units are grouped in long rows with projecting porches. Buildings similar to Building 1015 are Type N-3 units.

Type N-4 Frame Duplex Units

These units are grouped in attached pairs, with exteriors of frame siding. Buildings similar to Building 1875 are Type N-4 units.



Building 1824 (Type N-1)



Building 1016 (Type N-2)



Building 1875 (Type N-4)

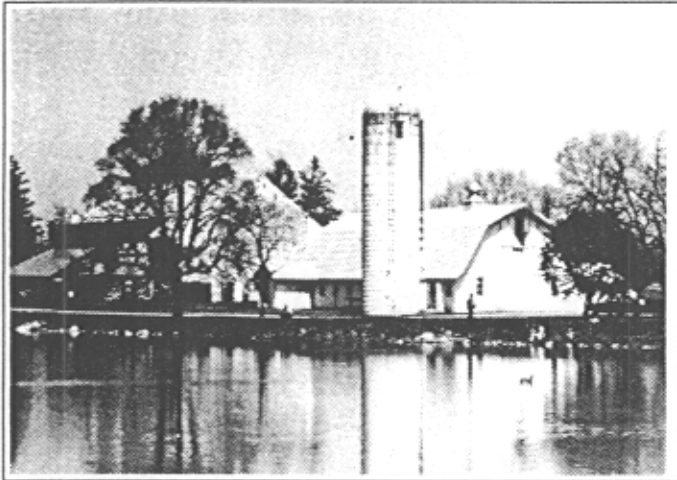


Building 1015 (Type N-3)

Type O

Historic Buildings

The Nallin Farm buildings comprise this group.



Nallin Farm Buildings

PLAZAS AND COURTYARDS

Plazas and courtyards are the outdoor rooms that provide a transition between indoor and outdoor spaces. They can serve several functions and should relate to the scale of the buildings that form them. Entry plazas should direct and focus attention to the building's entry. Plazas are also needed as gathering places. Finally, they should link and unify groups of buildings.

At Fort Detrick, attention has not been paid to these outdoor spaces, and for the most part the outdoor space exists as leftover area rather than as a structured outdoor setting for the people at Fort Detrick.

BACKGROUND

OPEN SPACE

There are two main locations of open space — the northern portion of the main post and Area B. This large, unbroken expanse of undeveloped area on the main post provides opportunities for facility expansion in an orderly, planned fashion. In addition, both areas provide visual relief from the increasing development of the area (see Figure 1-7).

PLANT MATERIALS

The natural vegetation at Fort Detrick is typical of the Frederick Valley region. However, because of the fertile soils, much of the natural forest was stripped and the lands were put to agricultural use. At Fort Detrick, approximately 15-20 percent of the area is tree covered, most of which was planted in conjunction with fort development projects. The majority of the forest areas considered most natural occur in Area B, with only three such areas present on the main post. Where natural areas do occur, their mix is generally walnut, hackberry, cherry, elm, tulip poplar, and locust. In wet areas, maple, willow, and elm predominate (see Figure 1-8).

Dominant planted species include pin oak, white ash, sweetgum, Norway and silver maples, hawthorne, crabapple, and linden. Large areas of old experimental groups of white

pine, loblolly pine, spruce, elm, and oak occur in rows in the main post where the Department of Agriculture and Vegetation Control Lab have approximately 189 acres currently permitted for experiments on plants of various types.

Street trees are a key element to defining primary streets and promoting a campuslike image. The street tree plantings are very incomplete. They are established in spotty, noncontinuous locations along Porter Street, Ditto Avenue, and Randall Street.

There is a lack of variety of types of trees and the existing ones are often poorly maintained, resulting in poor growth and specimens that do not reflect or fulfill design goals.

Shrubs have not been chosen with their natural characteristics — form and size — in mind. This has resulted in the limited maintenance resources being devoted to pruning. Shrubs exist in overgrown balls that do nothing to improve the visual scene.

The family housing area has benefited from the surrounding open space and stands of mature trees. However, plants have not been used to more intimately define personal space and entries. The plants used do not contribute to the residential character of the area.

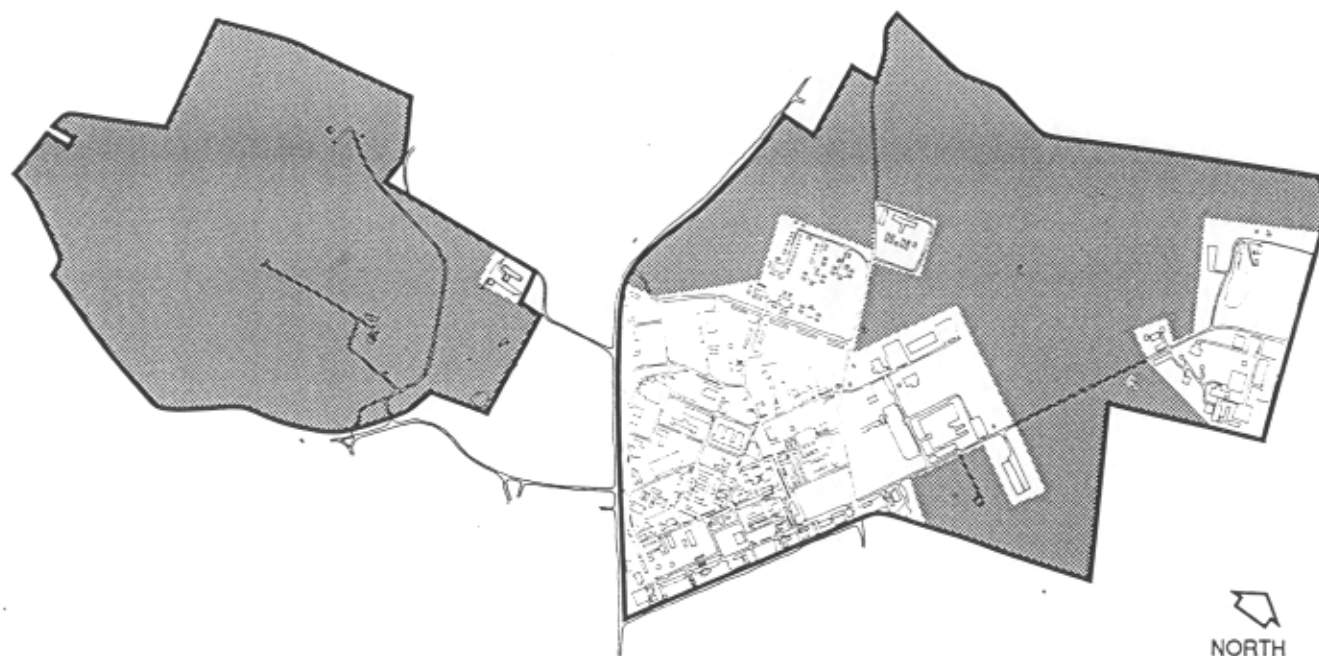
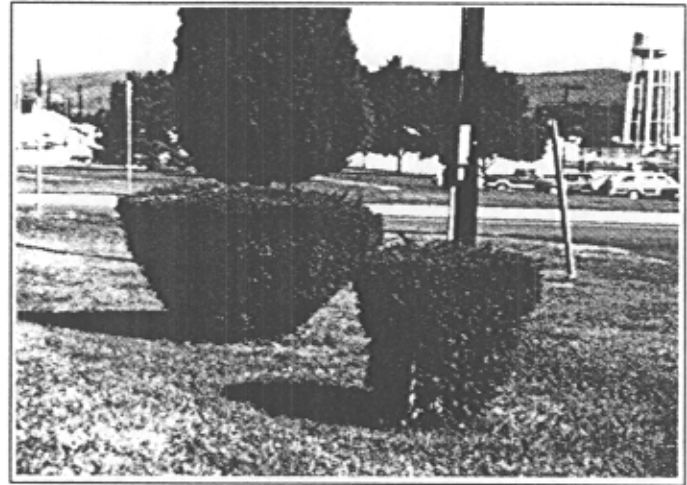


Figure 1-7: Open Space

Lack of sufficient maintenance appears to be a problem that adversely affects all plantings. The overall impression in the developed sections of the main post is one of insufficient green areas.

SITE ELEMENTS

Site elements are those relatively small individual elements that, as a whole, provide the opportunity to unify the visual environment. These include signs, lighting fixtures, and site furnishings. Unfortunately, there are no overall guidelines for the style and placement of site elements. As a result, they have been chosen as needed, resulting in a wide range of styles. They often are incorrectly placed and may not always be where needed. This incremental approach is a recurring theme of past development practices at Fort Detrick.



Plants exist in individual balls.



Figure 1-8: Major Tree Stands

IMAGE OF FORT DETRICK

During the last two decades, Fort Detrick has emerged as a center for medical and botanical research development, with associated medical logistics and intelligence commands. It also contains a major global telecommunications center. Its land area has increased from the original 90 acres to 1,212. However, this transition in missions has largely been accommodated within existing structures so that the look or visual image of the post has not changed. As a result, the visual image projected is not in keeping with Fort Detrick's current identity.

The perception of the post's current image is an important factor. Due to the history of chemical and biological warfare programs conducted at Fort Detrick, there persists to this day an impression by the general public that these programs still exist. The security fencing and general industrial look of the facility along Rosemont Avenue tend to reinforce this perception. Overcoming this negative impression is a major objective in improving the image of Fort Detrick. The reality of the multitude of research, development, communication, and support programs ongoing at Fort Detrick is not evident from the physical environment. The fact that Fort Detrick is a world leader in the medical research field should be projected to the public as well as to visitors and users of the facility.

BACKGROUND

HISTORY OF DEVELOPMENT

Fort Detrick is located in Frederick County, in north central Maryland approximately 47 miles from both Baltimore and Washington, D.C., on the northwest edge of Frederick. To the north and west, it is bounded by property under the jurisdiction of Frederick County and on the other sides by the city of Frederick (see Figure 1-1).



Figure 1-1: Regional Location

Frederick

The city of Frederick enjoys a desirable position as the third point in the "golden triangle" formed with Baltimore and Washington, D.C. The city was founded in 1745 by English and German settlers and was originally called Fredericktowne. As a frontier town, it served the wagon trains that traveled through the surrounding fertile farmland, blazing the early trails across the mountains to the West. Later, the town became a major crossroad and part of the Old National Pike, which, for more than two centuries, was the region's main route to the West.

Today, the city of Frederick is the largest city in the county. During the last decade, it has emerged from a quiet, farming community to a progressive city with the reputation of being a desirable place to live and conduct business. Frederick enjoys a proximity to the greater Baltimore-Washington metropolitan area, while it maintains the more manageable scale and affordable standard of living of a smaller city.

Frederick supports a thriving tourist industry that focuses on the Frederick Historic District, a 33-block area formed from the historic core of the city. The restoration of many of the district's residences and commercial structures, in conjunction with careful planning of new projects, has produced an environment and streetscape with a distinctive, 18th-century, Federal character. The Historic District is one of the largest in Maryland, second only to the city of Baltimore in number of sites listed on the National Register of Historic Places.



Frederick

Fort Detrick

Fort Detrick sits at the foothills of the Catoctin Mountains in the northwest corner of Frederick (see Figure 1-2). It began in 1929 as a municipal airfield when Frederick Airport, a Federal Bureau of Aeronautics emergency landing field, was established on 90 acres of the Nallin Farm. In 1930, the airfield was leased to the Maryland National Guard for use as a summer camp by the 104th Observation Squadron and named Detrick Field in honor of Major Frederick Louis Detrick, a member of the 29th Infantry Division Aviation Detachment during World War I.

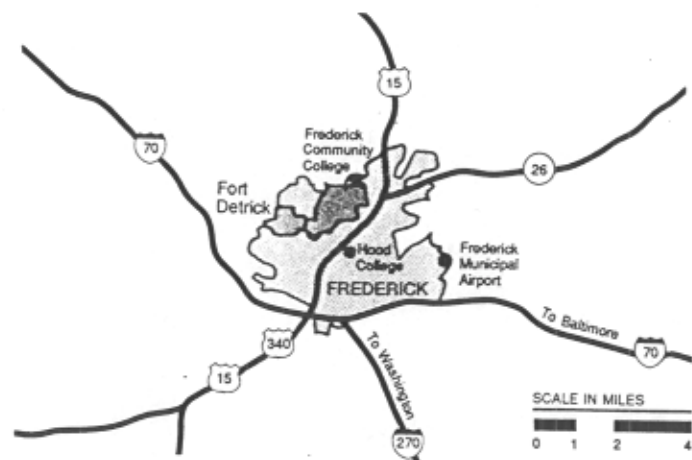


Figure 1-2: Vicinity Location

In the early 1930s, hangar and operational facilities were constructed and, in 1940, the field was leased by the Army Air Corps for aviation training. The installation was assigned to the Army Chemical Warfare Service in 1943 for development as a biological warfare research center and renamed Camp Detrick. In 1944, the original tract plus an adjoining 53 acres was purchased from the city of Frederick. Initially, research was conducted in various temporary facilities with the old aircraft hangar being converted into a pilot plant for anthrax production. Facilities built during and shortly after World War II (WW II) utilized either temporary, wood or semipermanent, structural-tile construction.

After WW II, the camp was designated a permanent installation. The grid area or Area "B," a 399-acre parcel, was purchased in 1946 for use as an outdoor test area. In 1947, the Army acquired an additional adjoining 153 acres. Between the end of WW II and the outbreak of the Korean War, the only permanent facilities constructed at the garrison were 48 family housing units, the Horton Test Sphere, two greenhouses, and a munitions loading building.

BACKGROUND

The Korean War led to an expedited construction program, lasting from 1952 through 1956, which provided permanent facilities for research. Also during this period, the Army acquired another 503 acres adjacent to the main garrison to accommodate plant sciences research.

On 1 February 1956, the post was formally designated Fort Detrick. The Army Reserve FLAIR Armory, built in 1956 in the grid area, became a tenant in 1958. During the subsequent years, permanent buildings were constructed, including those for the East Coast Telecommunications Center, U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID), and various support facilities.

The biological warfare mission continued until 1969 when, by Presidential Proclamation, research in the offensive aspects of biological warfare ceased. On 15 October 1971, the President announced that the biological research center facilities would be converted to the conquest of cancer. Also in 1971, research in plant pathology was established under the auspices of the Epiphytology Research Laboratory. The laboratory was later renamed the Plant Sciences Division, Agriculture Research Service, Department of Agriculture.

On 1 April 1972, the control of the fort was transferred from the U.S. Army Materiel Command to the Office of the Surgeon General, Department of the Army, and further assigned as a subordinate installation of the U.S. Army Medical Department. Shortly after the transfer, four medical department activities were assigned to the post. At the same time, the Biological Defense Research Laboratory, the last remnant of the original biological research center, was inactivated and the vanguard of Litton Bionetics, Inc., the contractor selected to operate the NCI FCRC, arrived. The Army granted the Department of Health and Human Services permission to use 80 acres of land encompassing 63 buildings, with subsequent amendments reducing the acreage to 71 and increasing the number of buildings to 67.

Today, Fort Detrick consists of a total of four individual parcels of land: the Main Post, Area B, and two small parcels of land along the Monocacy River that contain water and sewage treatment facilities. The Main Post, where most of the developed land is located, consists of 797 acres of land. Area B, which lies approximately one-half mile west of the Main Post, consists of an additional 399 acres, much of which is undeveloped open land. Uses of this undeveloped land include

an antenna farm, a landfill area, minor ordnance storage, and leased grazing area. FLAIR Armory, U.S. Army Reserve, occupies two buildings and approximately 28 acres of land in Area B for administrative, maintenance, and training activities.

Summary

Fort Detrick, like many installations, developed through accretion, that is, the continual acquisition of additional parcels of land. Since its beginnings in 1930 as 90-acre Detrick Field, it has grown to nearly 1,212 total acres, more than 13 times its original size. The physical layout can best be described as the dispersed gridiron plan commonly used by the military from early WW II to the present.

The problems inherently associated with this particular development scheme are evident at Fort Detrick. Facilities on a dispersed gridiron plan primarily exist as individual entities with little relationship to each other. Consequently, architectural character is inconsistent and building placement often ignores functional and energy-efficiency considerations. The dispersed layout works against the projection of a unified visual image on the post.

The physical layout of an installation provides the spatial framework in which views within the installation are perceived. Circulation patterns channel visual attention, while building masses enclose space. The lack of a central historic core or zone gives Detrick a disjointed appearance, and the chronological development of the facility is not readily perceived. Historic aspects of the facility have been overshadowed by subsequent development. This, in combination with a confusing and unstructured circulation system, has produced a site layout that lacks any sense of place or overall character.

INSTALLATION DESIGN GUIDE PURPOSE AND USE

INTRODUCTION

The Department of Defense (DOD) community looks to Fort Detrick, Maryland, as the world's leading microbiological containment research campus. Fort Detrick encompasses a multitude of activities and their associated missions, providing space for offices, laboratories, and advanced communications facilities for 26 tenant organizations that represent the Army, Navy, Air Force, Marine Corps, and the U.S. Department of Agriculture (USDA). The National Cancer Institute Frederick Cancer Research Center (NCI FCRC) is also a key component at this medical research and development (R&D) center.

During the last two decades, Fort Detrick has emerged as a center for medical and botanical research development, with associated medical logistics and intelligence commands. In addition, it also contains a major global telecommunications center. Its land area has increased from the original 90 acres to 1,212. However, this transition in missions has largely been accommodated within existing structures so that the look or visual image of the post has not changed. As a result, the visual image projected is not in keeping with Fort Detrick's current identity.

PURPOSE

The goal of the *Installation Design Guide* (IDG) is to facilitate the development of an appropriate visual image reflecting Fort Detrick's current mission. The IDG establishes guidance for the planning, design, and construction of all projects. It is a framework to guide the ongoing changes on the post, and, as such, can be a catalyst for positive change. This document provides a comprehensive set of standards and criteria for the design and development of all exterior elements. The ideas and projects presented in the IDG must be incorporated into the planning process and guide decision making. Strict adherence to the IDG is mandatory and will provide the means to establish a desired image and, as a result, improve and enhance the visual quality and character of the post over time.

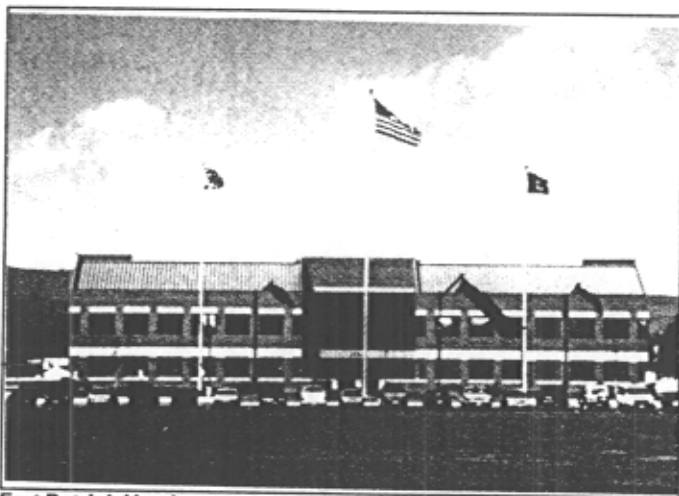
The IDG is an acknowledgment that a positive visual environment is desired at Fort Detrick. People spend as much time at their place of work as they do at home, and a positive, attractive visual environment is a component of a productive work environment. People also live on the post, and they have the right to reside in a pleasant, safe, attractive community.

The IDG provides the principles that will guide the ongoing development of Fort Detrick's exterior environment. All individual projects must be evaluated to see how they reflect the goals of the IDG.

The IDG shall not discourage creative planning and design by professionals using appropriate contemporary standards and criteria within the context of the installation.

The IDG is to be utilized by the Fort Detrick military and civilian staff as well as by architects, engineers, landscape architects, contractors, and any designers who will affect the exterior features of this installation.

The contents of this document are designed to remain valid for many years and to provide flexibility so that revisions and expansions can be accommodated as the need arises.



Fort Detrick Headquarters

BACKGROUND

PREVIOUS PLANNING EFFORTS

The documents of previous planning efforts at Fort Detrick were reviewed in the preparation of this IDG. This IDG incorporates aspects of these efforts, where appropriate. These documents include the *Fort Detrick Master Plan, Phases I and II (1984)*; the *Final Report, Historic Preservation Plan, Fort Detrick, Maryland (1988)*; the *Landscape Design Analysis Booklet (1984)*, which also included a *Landscape Master Plan*; and the *Recommended Supplement of Existing Landscaping Plan, Fort Detrick, Maryland (1988)*.

The city of Frederick has extensive specifications and details for site work, concrete and masonry, site furnishings, utilities, etc. Information concerning these is detailed for Fort Detrick in *Section 3: Design Guidelines*. However, every effort should be made to ensure that utilities, fire hydrants, manhole covers, and other details of this type are compatible with the city of Frederick. The *City of Frederick, Standard Construction Specifications (April 1985)* and the *City of Frederick, Standard Construction Details (April 1985)* should be consulted when questions along these lines arise.

All public spaces and buildings shall be handicapped accessible as required by *Federal Standard - 795, Uniform Federal Accessibility Standards*.

ORGANIZATION

The IDG is organized into three main sections:
1: Background, 2: Visual Zones, and 3: Design Guidelines.

The page numbering system reflects the section and page number. An example is:

2-1: 2 (Section: Visual Zones)-1 (page number)

Section 1: Background

This section includes: IDG Purpose and Use, History of Development, Image of Fort Detrick, Inventory and Analysis of Existing Conditions, and Conclusion. The Conclusion includes the Visual Zone Map and presents the visual theme. All of the general installation wide background information that is needed to begin exterior design, maintenance, renovation, or building is located in Section 1. This section provides the rationale and direction for the information presented in the next two sections.

Section 2: Visual Zones

This section describes the visual zones, which are areas within Fort Detrick that are visually separate or distinct due to land use, architecture, or site plan type. The zones are an organizational tool to facilitate an understanding of the visual quality of each area at Fort Detrick. This section describes each zone, identifying its location, character, assets and liabilities, and recommendations. This section is meant to serve as the definitive guide to questions related to the exterior environment within each zone.

Section 3: Design Guidelines

This section provides design guidance for the components of the exterior environment at Fort Detrick. There are written guidelines, specifications, and graphics representations for: Architecture, Roads, Parking, Paths, Plazas and Courtyards, Plant Materials, Signage, Lighting, Site Furnishings, and Utilities and Security. This section promotes a sense of continuity and visual unity for the many components of the visual environment. Individual specifications are contained on one page whenever possible, so that information may be easily removed and photocopied.

Appendix

Following the three sections is a Bibliography and a list of Abbreviations.

HOW TO USE

In order to undertake a design project, the installation will typically develop a package containing all pertinent information from each appropriate section for the persons taking the design or maintenance action. A guideline package can be custom-tailored for any project or job regardless of size by removing the needed pages, photocopying them and then returning the originals to the binder.

The guidelines package can be used to direct the installation of a single element such as a light, or it can guide an entire complex including site planning, buildings and accompanying paths, landscaping, plantings, and site furnishings. It is necessary to review the designer's conceptual plans and working drawings at the interim and final design stages. Construction of the project must also be inspected to ensure compliance with the IDG. In addition to continual monitoring throughout the development of a specific project, periodic inspections also must be conducted throughout the installation to verify proper maintenance procedures and in-house compliance with the IDG.

To illustrate how the IDG is used, three scenarios are outlined: an addition to an existing building with accompanying site furnishings; siting and design of a new building and landscape architectural elements; and a small site-furnishing project. For each scenario, the project criteria and scope must be established. It is important that all pertinent elements be considered so that the project is all-encompassing. The following steps should be taken for each scenario.

Addition to an Existing Building

1. Identify the zone in which the building is located by using the Visual Zones Map (Figure 1-9, page 1-25).
2. Determine the building type by referring to the section on existing building types in the Inventory and Analysis of Existing Conditions on pages 1-11 to 1-21.
3. Refer to the Design Guidelines Matrix for Existing Buildings on page 3-3 and locate the building type in the matrix. Note the page numbers of all applicable information. Locate the specific site furnishings to be included in the project using the matrix. Note the page numbers of all applicable information.

Turn to the specific pages within the *Design Guidelines*, remove and copy them. Note any references to other pages

and copy them. Copy *Section 1: Background*, and the proper visual zone in *Section 2: Visual Zones*.

Design of a New Building

1. Determine the appropriate new building prototype by referring to the matrix on page 3-1.
2. Refer to the matrix on page 3-2 for the page numbers of all applicable information about the building prototype.
3. Refer to the appropriate visual zones section in *Section 2: Visual Zones*, for information pertinent to this zone.
4. Refer to the matrixes on pages 3-8 to 3-12 for information on the appropriate landscape architectural elements including lighting, signage, site furnishings, and plant materials. Note all applicable page numbers.
5. Gather all appropriate *Design Guidelines* sections to be included in a summary package. Include *Section 1: Background* and the appropriate visual zone information from *Section 2: Visual Zones*.

Site Furnishings Project

1. Identify the visual zone in which the project is located, using the Visual Zones Map (Figure 1-9, page 1-25).
2. Refer to the matrix section of the *Design Guidelines* located on pages 3-1 to 3-12 and locate the specific elements appropriate to this zone. Note all applicable page numbers.
3. Look up these pages in the *Design Guidelines*, remove and copy them along with any appropriate background information from *Sections 1* and *2*.

Fort Detrick, Maryland

Installation Design Guidelines



Final
May 1991

Contract Number DACA 31-89-C-0111

BACKGROUND

IDG PURPOSE AND USE	1-1
Introduction	1-1
Purpose	1-1
Previous Planning Efforts	1-2
Organization	1-2
How To Use	1-3
HISTORY OF DEVELOPMENT	1-4
Frederick	1-5
Fort Detrick	1-5
Summary	1-6
IMAGE OF FORT DETRICK	1-7
INVENTORY AND ANALYSIS OF EXISTING CONDITIONS	1-8
Boundaries	1-8
Entries	1-10
Circulation	1-12
Architecture	1-16
Plazas and Courtyards	1-21
Open Space	1-22
Plant Materials	1-22
Site Elements	1-23
CONCLUSIONS	1-24
Visual Zones	1-24
IDG Theme	1-24

VISUAL ZONES

INTRODUCTION	2-1
MAIN ADMINISTRATIVE ZONE	2-3
Assets	2-3
Liabilities	2-3
Recommendations	2-4
1110TH SIGNAL BATTALION ZONE	2-7
Assets	2-7
Liabilities	2-7
Recommendations	2-8
FLAIR ARMORY ZONE	2-11
Assets	2-11
Liabilities	2-11
Recommendations	2-12

NCI ZONE	2-15
Assets	2-15
Liabilities	2-15
Recommendations	2-16
USAMRIID ZONE	2-19
Assets	2-19
Liabilities	2-19
Recommendations	2-20
USDA ZONE	2-23
Assets	2-23
Liabilities	2-23
Recommendations	2-24
PERSONNEL SUPPORT ZONE	2-27
Assets	2-27
Liabilities	2-27
Recommendations	2-28
FAMILY HOUSING ZONE	2-31
Assets	2-31
Liabilities	2-31
Recommendations	2-32
NALLIN FARM ZONE	2-35
Assets	2-35
Liabilities	2-35
Recommendations	2-36
INDUSTRIAL ZONE	2-39
Assets	2-39
Liabilities	2-39
Recommendations	2-40
WAREHOUSE ZONE	2-43
Assets	2-43
Liabilities	2-43
Recommendations	2-43

DESIGN GUIDELINES

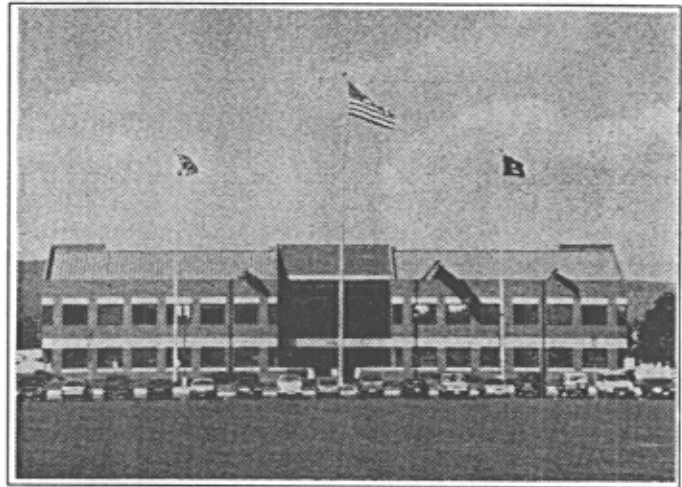
MATRIX	3-1
New Buildings Prototypes Matrix	3-1
New Building Matrix	3-2
Existing Buildings Matrix	3-3
Roads Matrix	3-4
Parking Matrix	3-5
Pedestrian Circulation Matrix	3-6
Plazas and Courtyards Matrix	3-7
Plant Materials Matrix	3-8

TABLE OF CONTENTS

MATRIX (cont.)	
Signage Matrix	3-9
Lighting Matrix	3-10
Site Furnishings Matrix	3-11
Security and Utilities Matrix	3-12
BOUNDARIES	3-13
Military Road Boundary	3-13
Rosemont Avenue Boundary	3-13
Opossumtown Pike Boundary	3-14
Eastern Boundary	3-14
Area B Boundary	3-14
ENTRIES	3-15
Main Entry	3-15
Rosemont Avenue Entry	3-15
Opossumtown Pike Entry	3-15
Area B Entry	3-15
ARCHITECTURE	3-17
Guidelines	3-17
New Building Prototypes	3-23
Existing Building Types	3-27
ROADS	3-31
General Principles	3-31
Hierarchy	3-32
Radii	3-33
Slopes	3-33
Intersections	3-33
Paving Materials	3-34
PARKING	3-35
General Principles	3-35
Paving Materials	3-35
Handicapped Access	3-35
Parking Lot Location	3-36
Pedestrian Circulation	3-36
Off-Street Parking	3-37
Setbacks	3-39
On-Street Parking	3-40
Landscaping	3-40
Loading Docks and Service Areas	3-43
PEDESTRIAN CIRCULATION	3-45
General Principles	3-45
Standards and Materials	3-45
Ramps	3-46
Steps	3-46
Crosswalks	3-47
PLAZAS AND COURTYARDS	3-49
Design Process	3-49
General Principles	3-49
Siting Considerations	3-51
General Types	3-52
Paving Materials	3-53
PLANT MATERIALS	3-55
General Principles	3-55
Plant Palette	3-55
Specifications	3-64
Planting Procedures	3-66
Plant Protection	3-67
Landscape Considerations	3-70
Maintenance	3-71
Pruning	3-74
Planting Screens	3-76
SIGNAGE	3-79
General Principles	3-79
Main Entry Sign	3-80
Secondary Entry Sign	3-81
Site Orientation Sign	3-82
Vehicular Directional Sign	3-83
Pedestrian Directional Sign	3-84
Building Identification Sign	3-85
Building Entrance Sign	3-86
Street Identification Sign	3-87
Standard Traffic Sign	3-88
Parking Lot Sign	3-89
Parking Space Sign	3-90
Area B Entry Sign	3-91
Residential Sign	3-92
LIGHTING	3-93
General Principles	3-93
Lighting Types	3-94
Lighting Placement	3-94
Standard Roadway Light Fixture	3-95
Standard Parking Lot Light Fixture	3-96
Standard Walkway Light Fixture	3-97
Standard Bollard Light Fixture	3-98
Residential Roadway Light Fixture	3-99
Residential Parking Lot/Walkway Light Fixture	3-100
Residential Bollard Light Fixture	3-101
Residential Wall-mounted Light Fixture	3-102

CONCLUSIONS

The creation of the *Installation Design Guide* document is the initial step toward improving the visual environment at Fort Detrick. However, only when ideas are actually incorporated into decisions making and these planning decisions are implemented will the IDG begin to have an impact on the post. This document should be viewed as the framework to guide the ongoing changes in the exterior environment at Fort Detrick and, as such, can be a catalyst for positive change.



Fort Detrick

Section 3: DESIGN GUIDELINES

Boundaries

The boundaries are the first and often only contact people have with Fort Detrick. The boundary areas receive the greatest amount of public exposure and it is at this point that the image is portrayed to the surrounding community. The boundaries should visually define Fort Detrick and distinguish it from the surrounding community. Any actions that affect the boundary should keep these ideas in mind. Guidelines are provided to direct development at the Military Road, Rosemont Avenue, Opossumtown Pike, and Eastern boundaries.

The appropriate sections of the *Design Guidelines* should be referenced for information on signage, lighting, site furnishings, and security and utilities for these areas.

Entries

Guidelines are provided to direct development at the Main, Rosemont, Opossumtown Pike, and Area B entries. The appropriate sections of the *Design Guidelines* should be referenced information on signage, lighting, site furnishings, and security and utilities for these areas.

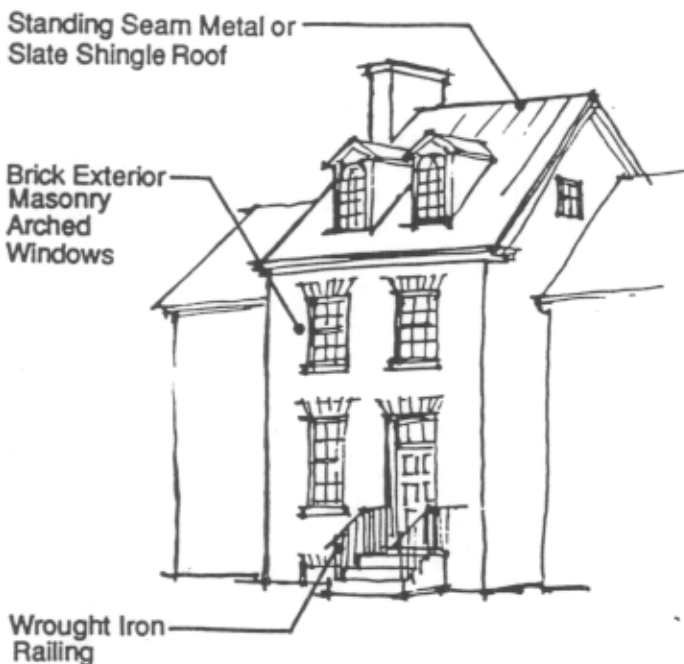


Figure 7: Federal Style Building

Architecture

The development of an open campus atmosphere supportive to scientific research should be conveyed in the architecture on post. The nearby historic downtown of Frederick serves as a valuable influence in establishing a theme for development at Fort Detrick. The following are the overall goals for the architectural treatment of existing and new buildings at Fort Detrick.

- Establish a uniform, recognizable palette of materials and colors for buildings.
- Establish guidelines for siting new structures in relation to vehicular and pedestrian circulation as well as to environmental and visual factors.
- Establish guidelines for restoration and adaptive reuse of existing structures.
- Enhance the identification of and access to buildings.

This section is intended to give an overview of design policy for application throughout Fort Detrick, in order to provide a common, unifying sense of consistency of materials and design elements. The design guidelines are based on the historic Federal style of the Frederick area, which can be seen most clearly at Fort Detrick on the Nallin Farm. The Federal style is characterized by plain massing, regular fenestration, emphasis of entries, and a vertical emphasis (see Figure 7).

Guidelines are provided for massing, windows, doors, roofs, materials, articulation, colors, residential areas, and additions. Prototypical designs are provided for a masonry laboratory building, masonry industrial building, small administration and support building, intermediate administration and support building, large administration and support building, large operations building, residential duplex, and residential four-unit apartment complex (see Figures 8 and 9).



Figure 8: Masonry Laboratory Building Prototype

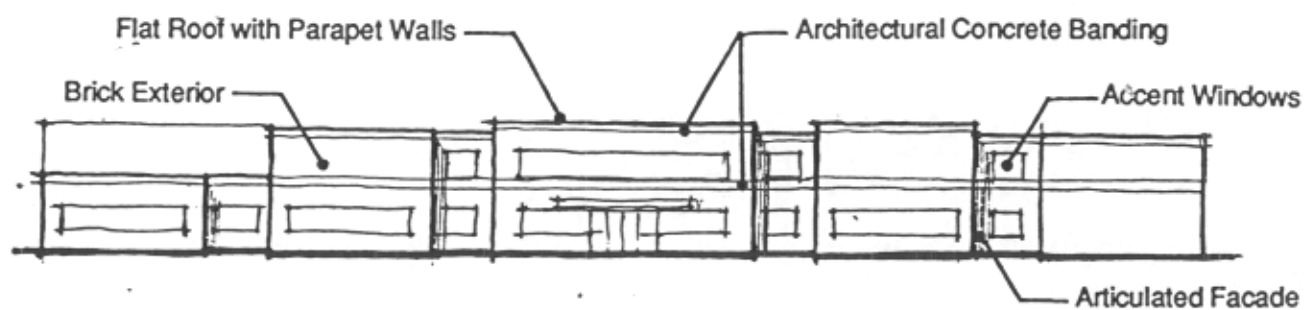


Figure 9: Large Operations Building Prototype

Roads

This section states the overall goals for improving the visual environment of the street system. They include:

- Implement the primary road system as outlined in the *Master Plan*. Designate Doughten Drive, Porter Street, and Ditto Avenue as primary streets that will have a minimum of curb cuts, sidewalks, street tree plantings, standard width, and prohibition of on-street parking. These streets will connect major destination points. In addition, extend Doughten Avenue to form a loop road
- Correct road alignments so that all roads intersect at 90-degree angles.
- Redesignate drives that are not through streets, such as an entrance to a parking lot or to the storage area of a building, so that they do not appear as streets.
- Establish a clear separation between roads and parking.
- Reinforce the hierarchy of trafficways by a clear differentiation between primary, secondary, and tertiary circulation through the development of appropriate streetscapes; these should include street trees, directional signage, site furnishings, and lighting.

Information is also provided to guide street naming and selection of radii, slopes, intersections, and paving materials.

Parking

Parking must be provided for a variety of needs at Fort Detrick: all-day parking must be provided for employees within a reasonable distance from the building in which they work; short-term parking is required for visitors near entries to the main facilities they frequent; parking areas are needed in the Family Housing Zone that are appropriate in scale and image to this setting; and, parking is needed for trucks and various types of equipment in the industrial areas. This section states the overall goals for parking. They are:

- Coordinate the location of all parking areas with the *Fort Detrick Storm Water Management Plan* and *Fort Detrick Environmental Baseline Study*.
- Separate parking from the streets both visually and physically.

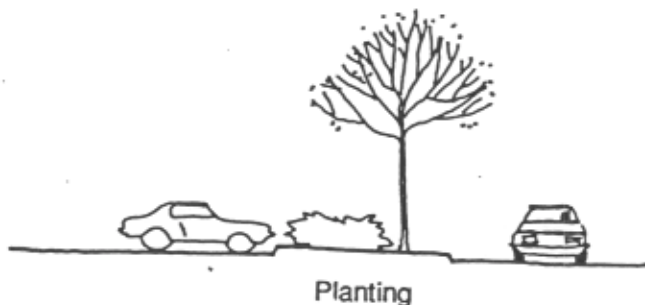
- Eliminate pull-in parking along streets.
- Parking lots should be sited in areas of need. As new buildings are built, provide parking near these structures and eliminate older, underused lots. Parking lots are to be shared whenever possible by facilities with different hours of operation. The total amount of parking needed for those facilities may be reduced accordingly.
- Site the parking lots to be subordinate to the buildings.
- Provide access to the major entries of the buildings.
- Provide adequate pedestrian circulation through and around the parking areas.
- Parking lots should be a series of medium to small lots, separated by planting islands, grade changes, etc.
- Screen the parking area from prominent view both within and outside the post.
- All permanent parking areas must designate parking spaces with white striping (doubled striping is preferred) to organize the lot and to maximize its use.
- Provide visitor and handicap parking near the entries to buildings.
- All lots must be identified with signage that designates its use.
- Finished grades must be one percent or greater. Transverse slopes are to be 4 percent or less.

Information is provided on paving materials, handicapped access, parking lot location, pedestrian circulation within parking lots, off-street and on-street parking, setbacks and landscaping of parking lots, and parking for loading docks and service areas (see Figure 10).

Pedestrian Circulation

Sidewalks form the basis of the pedestrian circulation system at Fort Detrick. This section states the general principles to be followed in designing sidewalks. They include:

- Provide circulation for pedestrians between major areas and within zones.



- Provide sidewalks along streets to facilitate movement between major areas, to reinforce the streetscape and structure, and to promote the concept of Fort Detrick as a campus.
- Provide sidewalks within zones between major buildings or destination points.
- Integrate the jogging trail with the other pedestrian paths.
- Sidewalks should be aligned to create a continuous pedestrian system throughout the post.
- Construction of walkways must be considerate of mature trees, avoiding removal or destruction of the existing vegetation whenever possible.
- Focal points including prominent buildings, landscape elements, site furnishings, or signage should be incorporated into the pedestrian circulation system to help orient the pedestrian.
- Most sidewalks shall be aligned parallel to the road.
- If space permits, the sidewalks should be set back 6 to 8' to allow for a landscape buffer. However, in areas with existing sidewalks that are located directly adjacent to the curb, new sidewalks should follow this pattern.
- Sidewalk width will vary depending on the importance of the street and the volume of pedestrian use. However, the minimum width for a sidewalk is 4'.
- Ramps and steps attached to a building must be an integral part of the entry of the building. Materials, fenestration, and railing must all relate to the architecture.
- Sidewalks must not intersect with catch basins, hydrants, unusual changes in grade, or with any other safety hazards. If manholes must be located in the sidewalk, the cover must be of a special type in which the lid is paved in the same material as the sidewalk.

Information is provided on paving materials, ramps, steps, and crosswalks.

Figure 10: Separation of Parking Lot and Road

Plazas and Courtyards

Plazas are the outdoor rooms that encourage pedestrian activity, create focal points, and provide space for informal gatherings. They provide a transition between indoor and outdoor spaces. Plazas should relate both functionally and visually to the surrounding architecture. Entry plazas should be designed to direct people and focus attention to the entry. Plazas are needed as gathering places. When located between buildings, they serve to link and unify a group of buildings. Plazas should be related to buildings and are an integral part of the structural fabric of the site. These spaces need to be provided in the various zones on the post.

Information is provided to guide the design of plazas and courtyards in relation to the scale, ground plane, vertical plane, overhead plane, siting considerations, and general plaza types (see Figures 11, 12, and 13).

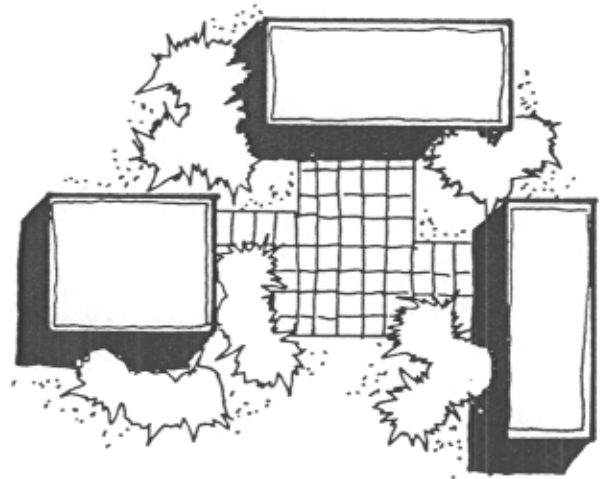


Figure 12: Social Spaces

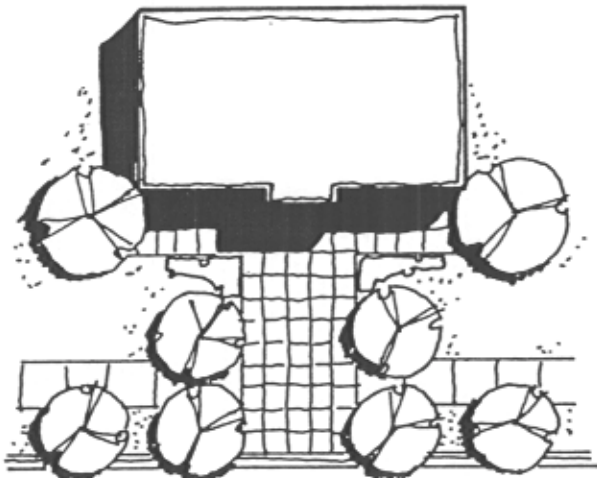


Figure 11: Building Entrances

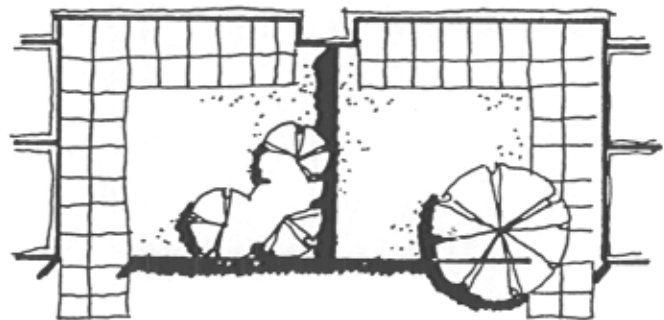


Figure 13: Family Spaces

EXECUTIVE SUMMARY

Plant Materials

Plant materials can be a valuable visual asset to Fort Detrick. All plants require maintenance and attention to assure their survival and to maintain the design intent. The plant materials at Fort Detrick currently receive less-than-adequate maintenance due to lack of resources available for this purpose. Every effort should be made to increase the budget designated for this purpose with the realization that without maintenance, plants will not thrive and the time and money invested in them will be wasted.

All overgrown and unhealthy plants and all plants that exist as individual balls should be systematically removed. These plants drain the maintenance resources.

A survey should be undertaken to identify these plants and plan for their removal.

Plants should be chosen with their natural height and form in mind so that pruning will not be required to maintain the desired effect.

The survival of plant material depends on their ability to adapt to environmental conditions. Seasonal changes in temperature, rainfall, and humidity, as well as soil properties must be considered when plant material are selected for Fort Detrick.

The following are the overall priorities that should guide decisions regarding plant materials projects:

- Trees should be planted along the fence lines of the Military Road, Rosemont Avenue, and eastern boundaries.
- Street trees should be planted along all primary streets and within the family housing zone.
- A greater variety of trees, including shade, flowering, and evergreen, should be planted in conjunction with any building project.
- The plantings at the entrances should be improved to include areas for seasonal flowers. These are appropriate areas for large displays of seasonal color.

A plant materials palette, based on its suitability and adaptability to conditions in the Frederick, Maryland area, is provided. Plants of different sizes, shapes, foliage colors, flowers, and fruits provide the possibility for visual changes year round. The use of plant materials from this palette will contribute to the visual unity of the landscape throughout the post.

Signage

this section provides the written and graphic guidelines for a wide range of signage needed at Fort Detrick. Principles that should be followed in the design and location of all signage on the post is as follows..

- When possible, consolidate signs into a unified system to avoid landscape clutter.
- Combine signs with lighting fixtures to reduce unnecessary posts and to enhance overall illumination.
- Information signs should be placed at natural gathering points and should be included in the design of site furnishings, such as kiosks.
- Avoid placement of signs where they may conflict with pedestrian traffic.
- Sign location should avoid conflict with door openings or vehicular operation.
- Sign location should not be obstructed by parked vehicles, site furnishings, or other objects.
- Signs should be placed to allow safe pedestrian clearance, vertically and laterally.
- Information contained on a sign should be as concise and direct as possible.
- Lettering and graphic symbols should be bold and simple.
- Contrasting color schemes (light images on dark backgrounds) make signs easier to read.

Lighting

Lighting provides security and illumination and contributes to the aesthetic character of an area. There are certain areas, such as the Fort Detrick entry signs, security control points, and building entrances that should be well lighted. The remaining areas should be in low-ambient luminance that satisfies security requirements while contributing to the desired visual character. The glare of intensive light sources should be eliminated by selection of appropriate fixtures and placement, or by an architectural or landscape architectural solution.

Light fixtures are needed in a wide range of instances. The scale or size of the fixture should be appropriate to its setting. In other words, a lighting fixture that would be appropriate in a parking lot would be too large along a pedestrian walkway. Lighting fixtures must complement the color, materials, and style of the surrounding buildings or area.

In all zones, except for Family Housing and the Nallin Farm Zones, the basic "shoe box" fixture will be used (see Figure 14). There are special fixtures for the Family Housing and Nallin Farm Zones. The lighting fixtures in the 1110th Signal Battalion Zone are white globes on white posts. It is recommended that these fixtures be replaced with the basic "shoe box" fixture. This must be done as the existing fixtures wear out. The existing fixtures should be replaced in groups.

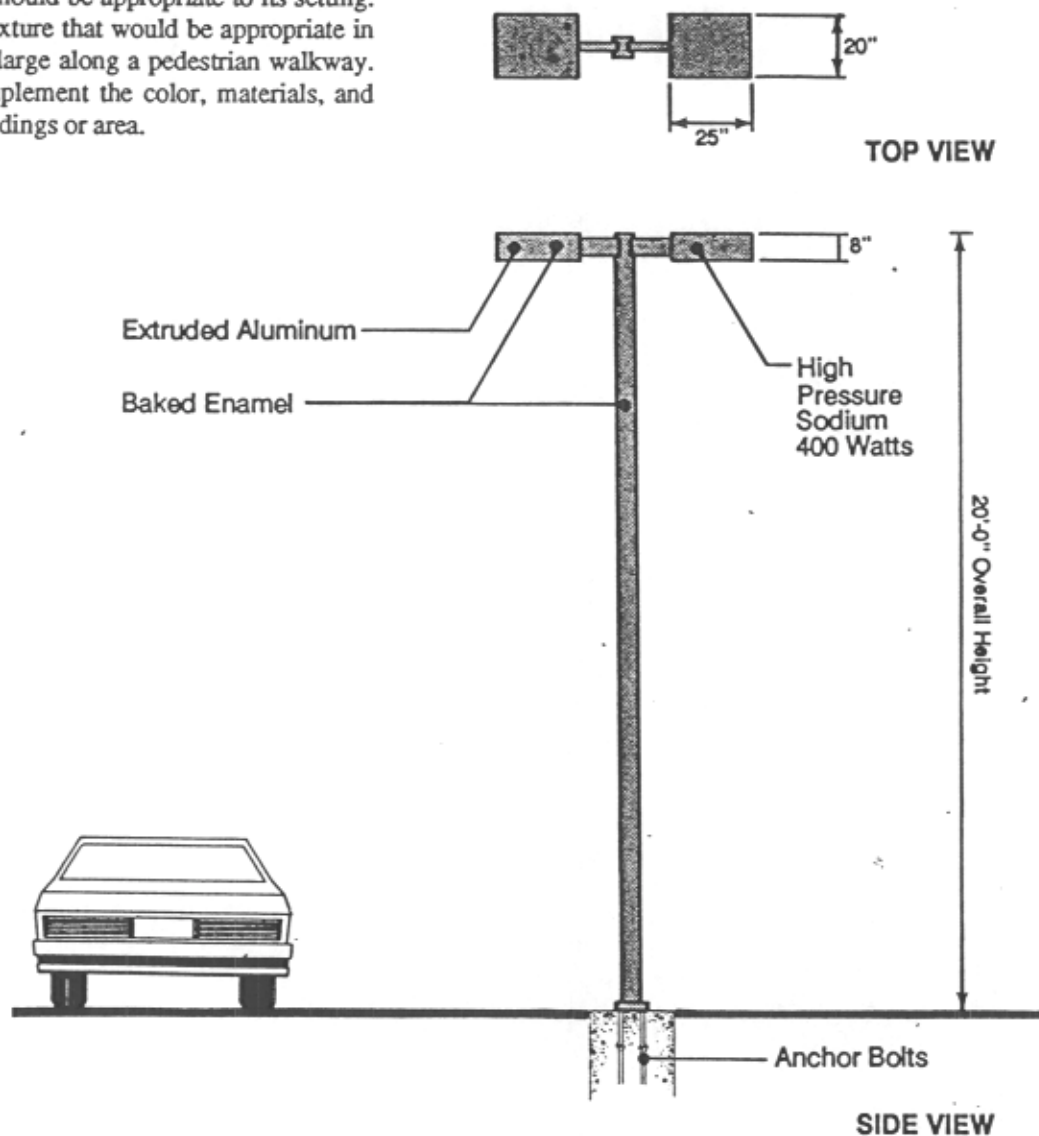


Figure 14: Standard Shoe Box Light Fixture

Site Furnishings

The written and graphic information for a range of site furnishings, appropriate for both formal and informal areas, is provided in the IDG. There are guidelines for tables and chairs, benches, trash receptacles, planters, water fountains, bike racks, tree grates, and flag poles.

Security and Utilities

General principles to guide the installation and development of security and utility needs are provided. In addition, two types of fencing are specified: a chain-link fence, and a wrought-iron fence. The latter is designated for use along the Military Road boundary where the image of the post is critical (see Figure 15).

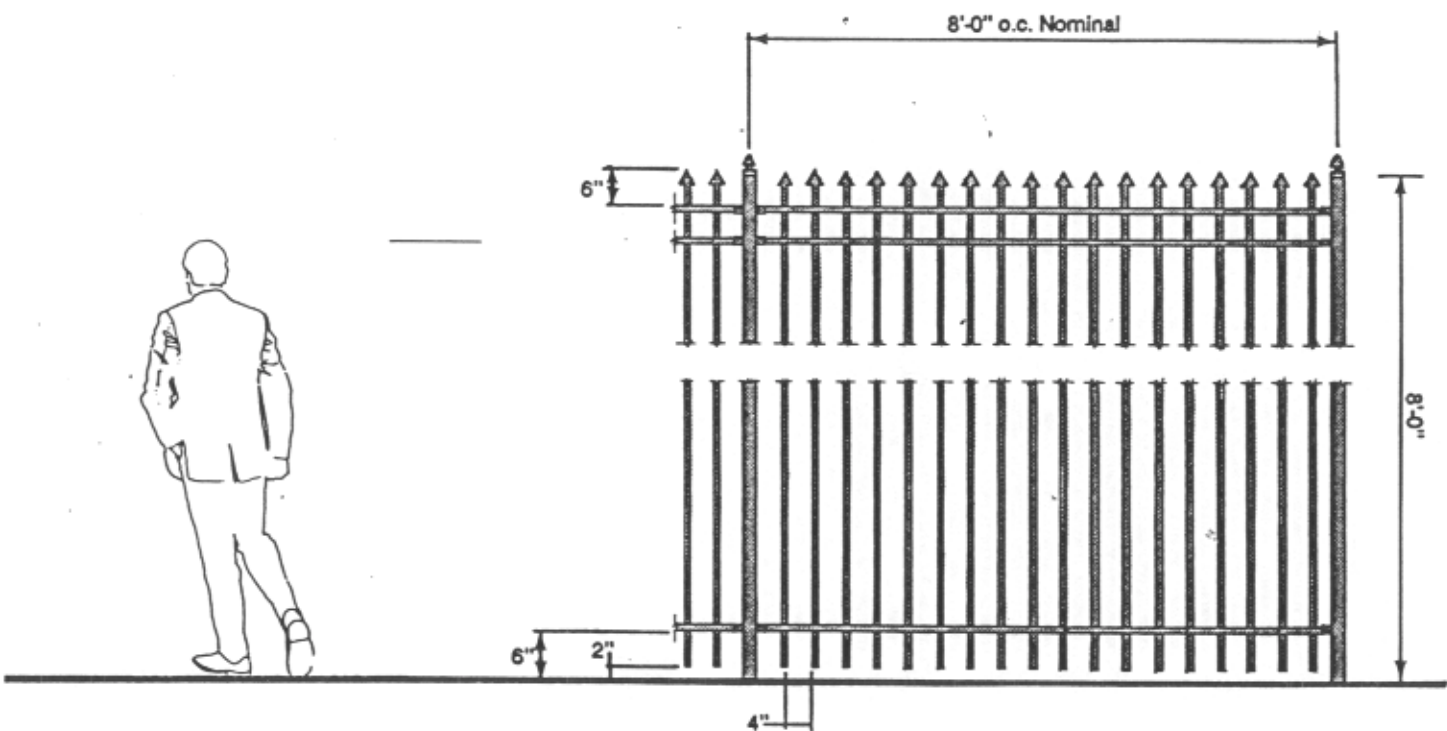


Figure 15: Wrought Iron Fence for Military Road Boundary

Section 2: VISUAL ZONES

After completing the inventory and analysis at Fort Detrick, the post was divided into 11 zones. These zones are used as an organizational tool throughout the IDG and were designated based on shared land use and visual characteristics within the zone (see Figure 5). Within zones, there are similar needs in relation to the exterior environment such as architectural style, outdoor spaces, parking, etc. The visual zones are as follows:

Main Administrative Zone

1110th Signal Battalion Zone

FLAIR Armory Zone

NCI Zone

USAMRIID Zone

USDA Zone

Personnel Support Zone

Family Housing Zone

Nallin Farm Zone

Industrial Zone

Warehouse Zone

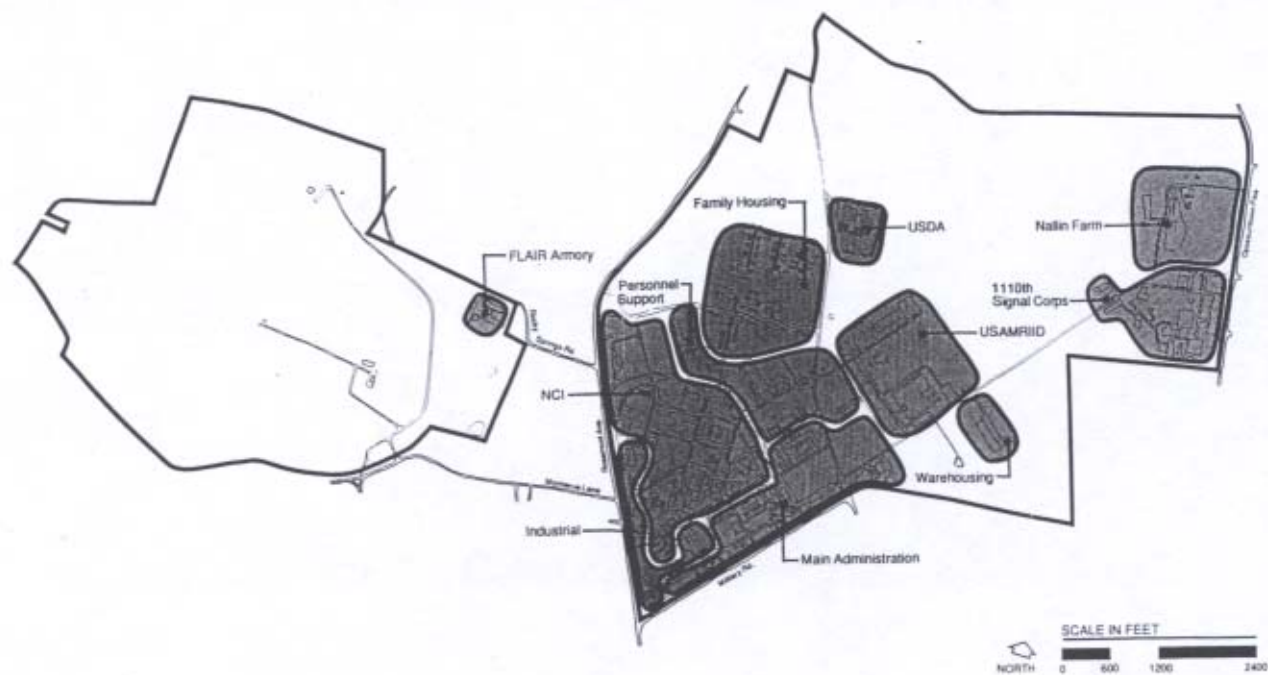
This section presents information that is specific to each of the visual zones. A general description and list of the assets and liabilities, keyed to a site zone map, are given for each zone. Recommendations are given relating to the overall zone and to new and existing architecture. These recommendations should be consulted during the planning process to help direct budgetary and administrative actions.

The IDG focuses its recommendations on the built environment. However, there are areas at Fort Detrick that are not part of this built environment and have not been assigned to a visual zone. Areas that are not designated as a particular visual zone consist of open space. These open space areas generally contain few structures and roads. However, they serve a variety of needs related to recreation, research, and agricultural at Fort Detrick. In addition, the *Fort Detrick Master Plan Phases I and II (1984)* specifies some of these areas for future expansion.

The overall goals, or theme, of the IDG as reflected in the recommendations for the visual zones are as follows:

- Project an image of Fort Detrick as an outstanding biomedical R&D center and provide the physical environment that reflects this image.
- Organize the visual environment.
- Strengthen the perception and functioning of the "community" at Fort Detrick. In many ways, the post is a small city. The IDG should provide for the development of amenities and strengthen connections between the various districts of the community.

Figure 5: Visual Zones



Section 1: BACKGROUND

History of Development

Fort Detrick is located in Frederick County, in north central Maryland approximately 47 miles from both Baltimore and Washington, D.C., on the northwest edge of Frederick. To the north and west, it is bounded by property under the jurisdiction of Frederick County and on the other sides by the city of Frederick (see Figure 1).



Figure 1: Regional Location

Frederick

The city of Frederick enjoys a desirable position as the third point in the "golden triangle" formed with Baltimore and Washington, D.C. The city was founded in 1745 by English and German settlers and was originally called Fredericktowne. As a frontier town, it served the wagon trains that traveled through the surrounding fertile farmland, blazing the early trails across the mountains to the West. Later, the town became a major crossroad and part of the Old National Pike, which, for more than two centuries, was the region's main route to the West.

Today, the city of Frederick is the largest city in the county. During the last decade, it has emerged from a quiet, farming community to a progressive city with the reputation of being a desirable place to live and conduct business. Frederick enjoys a proximity to the greater Baltimore-Washington metropolitan area, while it maintains the more manageable scale and affordable standard of living of a smaller city.

Frederick supports a thriving tourist industry that focuses on the Frederick Historic District, a 33-block area formed from the historic core of the city. The restoration of many of the district's residences and commercial structures, in conjunction with careful planning of new projects, has produced an environment and streetscape with a distinctive, 18th-century, Federal character. The Historic District is one of the largest in Maryland, second only to the city of Baltimore in number of sites listed on the National Register of Historic Places.



Frederick

EXECUTIVE SUMMARY

Fort Detrick

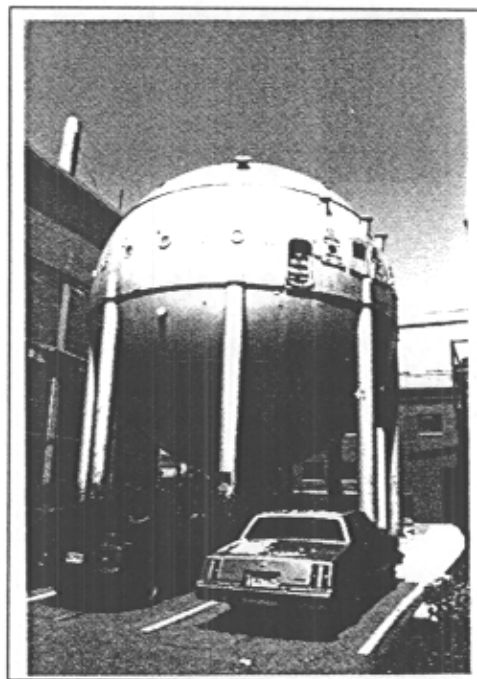
Fort Detrick sits at the foothills of the Catoctin Mountains in the northwest corner of Frederick (see Figure 2). It began in 1929 as a municipal airfield when Frederick Airport, a Federal Bureau of Aeronautics emergency landing field, was established on 90 acres of the Nallin Farm. In 1930, the airfield was leased to the Maryland National Guard for use as a summer camp by the 104th Observation Squadron and named Detrick Field in honor of Major Frederick Louis Detrick, a member of the 29th Infantry Division Aviation Detachment during World War I.



Figure 2: Vicinity Location

In the early 1930s, hangar and operational facilities were constructed and, in 1940, the field was leased by the Army Air Corps for aviation training. The installation was assigned to the Army Chemical Warfare Service in 1943 for development as a biological warfare research center and renamed Camp Detrick. In 1944, the original tract plus an adjoining 53 acres was purchased from the city of Frederick. Initially, research was conducted in various temporary facilities with the old aircraft hangar being converted into a pilot plant for anthrax production. Facilities built during and shortly after World War II (WW II) utilized either temporary, wood or semipermanent, structural-tile construction.

After WW II, the camp was designated a permanent installation. The grid area or Area B, a 399-acre parcel, was purchased in 1946 for use as an outdoor test area. In 1947, the Army acquired an additional adjoining 153 acres. Between the end of WW II and the outbreak of the Korean War, the only permanent facilities constructed at the garrison were 48 family housing units, the Horton Test Sphere, two greenhouses, and a munitions loading building.



Horton Test Sphere



USDA Greenhouses



East Coast Telecommunications Satellites

The Korean War led to an expedited construction program, lasting from 1952 through 1956, which provided permanent facilities for research. Also during this period, the Army acquired another 503 acres adjacent to the main garrison to accommodate plant sciences research.

On 1 February 1956, the post was formally designated Fort Detrick. The Army Reserve FLAIR Armory, built in 1956 in the grid area, became a tenant in 1958. During the subsequent years, permanent buildings were constructed, including those for the East Coast Telecommunications Center, U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID), and various support facilities.

The biological warfare mission continued until 1969 when, by Presidential Proclamation, research in the offensive aspects of biological warfare ceased. On 15 October 1971, the President announced that the biological research center facilities would be converted to the conquest of cancer. Also in 1971, research in plant pathology was established under the auspices of the Epiphytology Research Laboratory. The laboratory was later renamed the Plant Sciences Division, Agriculture Research Service, Department of Agriculture.

On 1 April 1972, the control of the fort was transferred from the U.S. Army Materiel Command to the Office of the Surgeon General, Department of the Army, and further assigned as a subordinate installation of the U.S. Army Medical Department. Shortly after the transfer, four medical department activities were assigned to the post. At the same time, the Biological Defense Research Laboratory, the last remnant of the original biological research center, was inactivated and the vanguard of Litton Bionetics, Inc., the

contractor selected to operate the NCI FCRC, arrived. The Army granted the Department of Health and Human Services permission to use 80 acres of land encompassing 63 buildings, with subsequent amendments reducing the acreage to 71 and increasing the number of buildings to 67.

Today, Fort Detrick consists of a total of four individual parcels of land: the Main Post, Area B, and two small parcels of land along the Monocacy River that contain water and sewage treatment facilities. The Main Post, where most of the developed land is located, consists of 797 acres of land. Area B, which lies approximately one-half mile west of the Main Post, consists of an additional 399 acres, much of which is undeveloped open land. Uses of this undeveloped land include an antenna farm, a landfill area, minor ordnance storage, and leased grazing area. FLAIR Armory, U.S. Army Reserve, occupies two buildings and approximately 28 acres of land in Area B for administrative, maintenance, and training activities.

EXECUTIVE SUMMARY



USAMRIID

Summary

Fort Detrick, like many installations, developed through accretion, that is, the continual acquisition of additional parcels of land. Since its beginnings in 1930 as 90-acre Detrick Field, it has grown to nearly 1,212 total acres, more than 13 times its original size. The physical layout can best be described as the dispersed gridiron plan commonly used by the military from early WW II to the present.

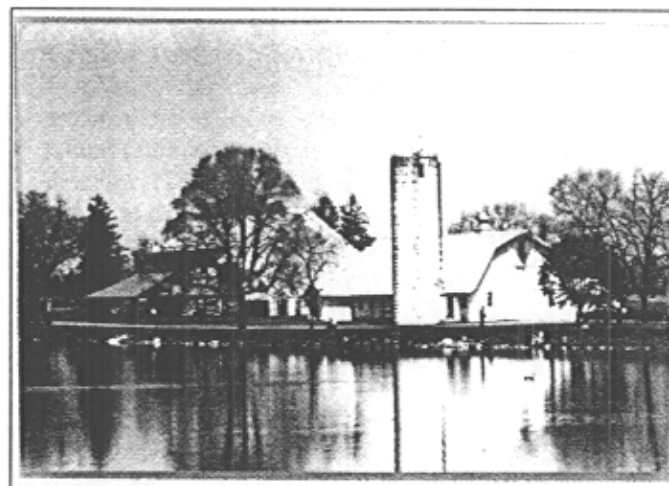
The problems inherently associated with this particular development scheme are evident at Fort Detrick. Facilities on a dispersed gridiron plan primarily exist as individual entities with little relationship to each other. Consequently, architectural character is inconsistent and building placement often ignores functional and energy-efficiency considerations. The dispersed layout works against the projection of a unified visual image on the post.

The physical layout of an installation provides the spatial framework in which views within the installation are perceived. Circulation patterns channel visual attention, while building masses enclose space. The lack of a central historic core or zone gives Detrick a disjointed appearance, and the chronological development of the facility is not readily perceived. Historic aspects of the facility have been overshadowed by subsequent development. This, in combination with a confusing and unstructured circulation system, has produced a site layout that lacks any sense of place or overall character.

Image of Fort Detrick

During the last two decades, Fort Detrick has emerged as a center for medical and botanical research development, with associated medical logistics and intelligence commands. It also contains a major global telecommunications center. However, this transition in missions has largely been accommodated within existing structures so that the look or visual image of the post has not changed. As a result, the visual image projected is not in keeping with Fort Detrick's current identity.

The perception of the post's current image is an important factor. Due to the history of chemical and biological warfare programs conducted at Fort Detrick, there persists to this day an impression by the general public that these programs still exist. The security fencing and general industrial look of the facility along Rosemont Avenue tend to reinforce this perception. Overcoming this negative impression is a major objective in improving the image of Fort Detrick. The reality of the multitude of research, development, communication, and support programs ongoing at Fort Detrick is not evident from the physical environment. The fact that Fort Detrick is a world leader in the medical research field should be projected to the public as well as to visitors and users of the facility.



Nallin Farm

Inventory and Analysis of Existing Conditions

Boundaries

The boundaries are the first and often the only contact people have with Fort Detrick (see Figure 3). They establish the visual image as it is perceived by the surrounding community. These areas reflect the character of the base and are a visual interface with the surrounding communities.

There are four boundaries that have a high degree of interface with the public. They are the Military Road, Rosemont Avenue, Opossumtown Pike, and eastern boundaries. Improvements need to be made along all these boundary areas to enhance the image projected to the surrounding community.



Military Road Boundary

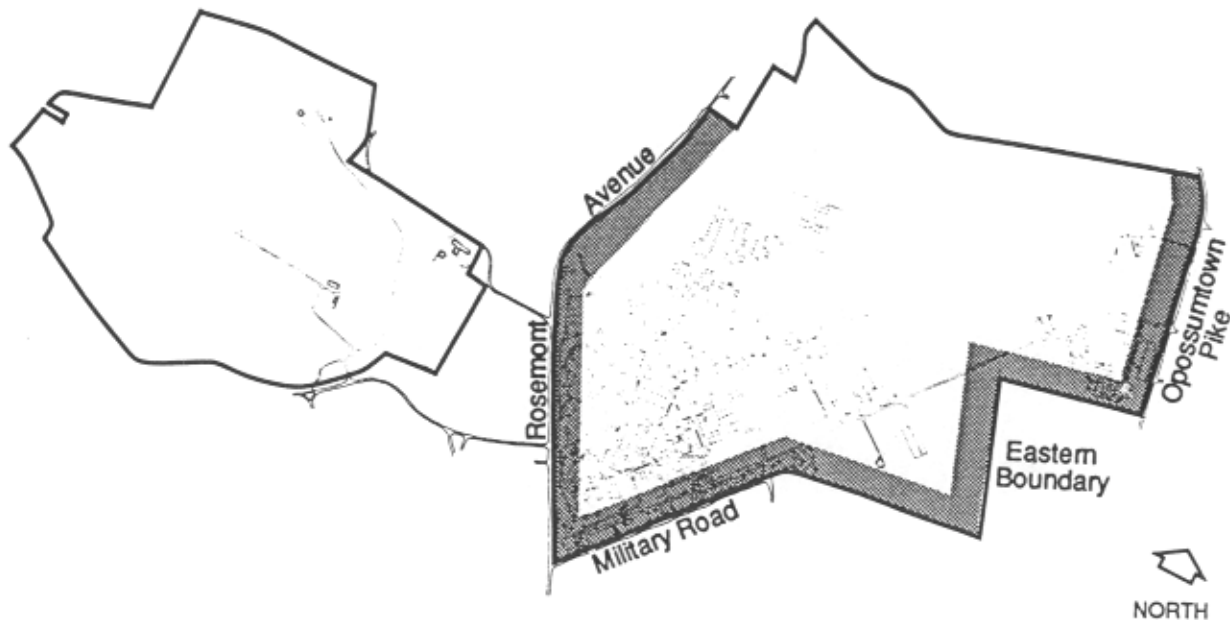


Figure 3: Fort Detrick Boundaries

EXECUTIVE SUMMARY

Entries

There are three entries to the main facility — the Main Gate, the Rosemont Avenue Gate, and the Opossumtown Pike Gate. In addition, there are two entries that are not used on a regular basis; one on Rosemont Avenue and one at the Nallin Farm. There is one entrance to Area B located on Montevue Lane (see Figure 4). The entries are a transition from the community into Fort Detrick and should announce this fact visually. They should be immediately recognizable as a gateway into the facility. Unfortunately, this is not the case with the existing entry designs. They generally have a generic appearance that does little to announce the entry as a gateway to Fort Detrick.



Main Entry

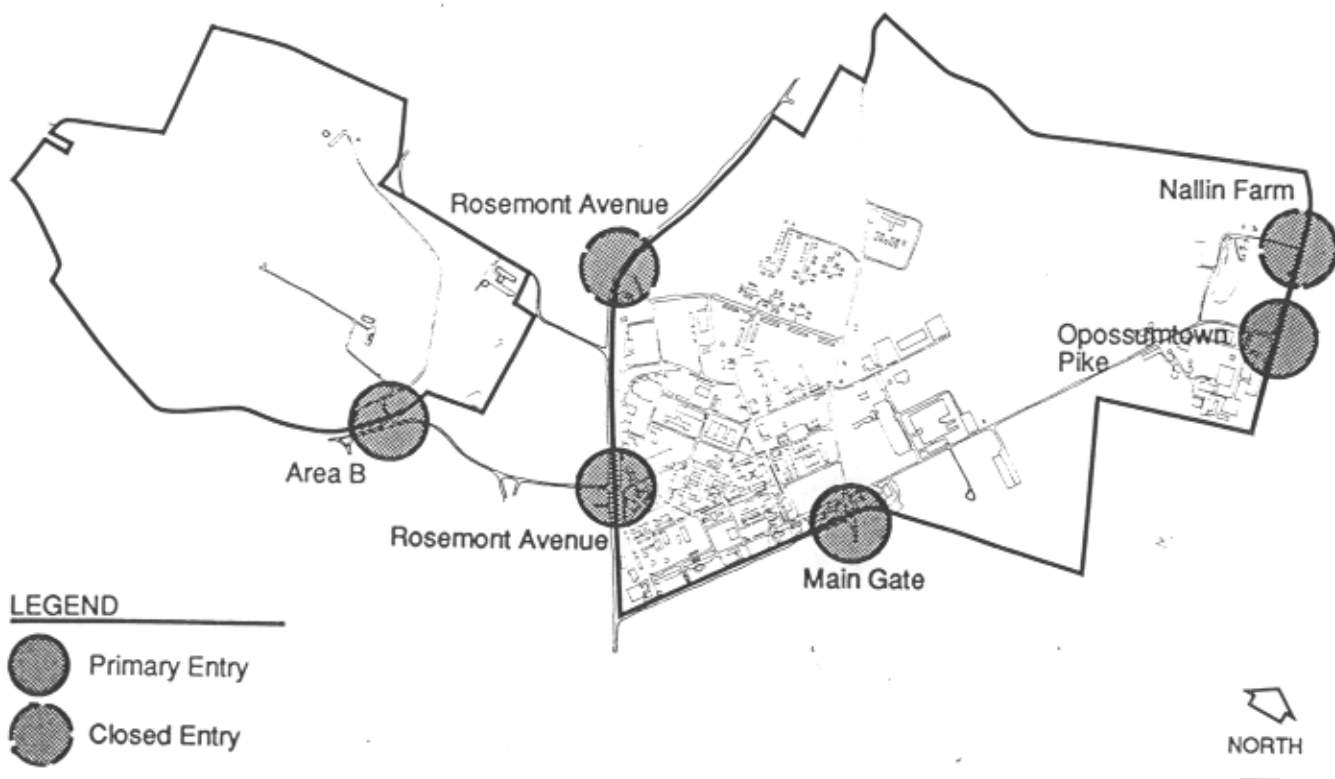


Figure 4: Fort Detrick Entries

Circulation

Streets

The streets, and to a lesser extent the sidewalks, are the vantage point from which people view the exterior environment. In this way, the streets control the perception of the buildings and site. In addition, the streets form the spatial pattern of the site, controlling the siting of individual buildings and their relation to each other. The major problems with the circulation system at Fort Detrick are the lack of hierarchy in the streets and confusing street layouts.

Pedestrian

The pedestrian system, which consists primarily of sidewalks, is incomplete. The sidewalks end abruptly in many cases, such as along Sultan Drive across from Buildings 1423 and 1425. In other cases, the lack of sidewalks isolates one area from another. This is the case with the lack of sidewalks along Ditto Avenue all the way out to the USDA zone. Sidewalks must be provided along all streets. There must also be internal connections between major destination points within zones. The intersections of the pedestrian system and the roads, such as crosswalks, need to be designated in an obvious and consistent way. A pedestrian circulation system is needed to provide a safe means of travel for the people who work and live on Fort Detrick. The sense of connection between the various zones, provided by sidewalks, promotes the perception of Fort Detrick as a community.

Parking

There is a great demand for parking spaces at Fort Detrick, because the majority of the post's employees drive to work. In addition, there are the residents of Family Housing and the bachelor quarters, as well as visitors to the post. This results not only in a large demand for parking spaces at the fort, but also in the need for parking for a variety of situations: all-day parking must be provided for employees within a reasonable distance from the buildings in which they work; short-term parking is required for visitors near the entries to the main facilities they frequent; and finally, parking areas are needed in the Family Housing zone that are appropriate in scale and image to this setting.

The current parking lots are, for the most part, large, unbroken expanses of paving. They do not contain planting islands or other means of integrating the lots into the surrounding landscape. They often do not relate well to the sitings of the buildings they are serving and do not have paths tying them to the entries. The overall result of the parking situation is that these large parking lots dominate the surrounding visual scene.

EXECUTIVE SUMMARY

Architecture

There is a wide range of building styles at Fort Detrick that bear little relation to each other. As a result, there is no predominant Fort Detrick architectural theme. The existing situation detracts from the visual environment. The most consistent theme on the post is that of relatively large, two-story buildings with red brick exteriors and pitched roof surfaces. The following are the main types of buildings found on the post. A description of each is included in the IDG.

Type A: Semi-Permanent Concrete Block Buildings

Type B: Temporary Frame Barracks

Type C: Temporary Utility Buildings

Type D: Temporary Modular Units

Type E: Semi-Permanent Community Buildings

Type F: Masonry Laboratory Buildings

Type G: Masonry Process and Industrial Buildings

Type H: Animal Facilities

Type I: Pre-engineered Metal Utility Buildings

Type J: Pre-engineered Office Buildings



Type L Building

Type K: Large Operations Buildings

Type L: Modern Administration and Support Buildings

Type M: Masonry Industrial Buildings

Type N: Family Housing

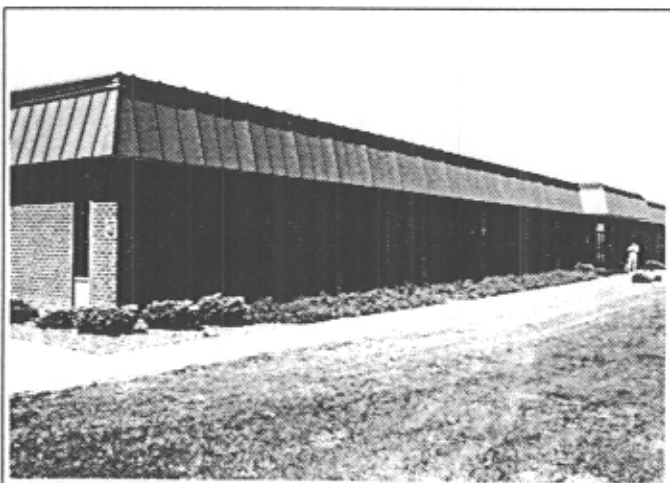
Type N-1 Duplex Townhouse Units

Type N-2 Attached Wood Frame Townhouse Units

Type N-3 Attached Masonry Townhouse Units

Type N-4 Frame Duplex Units

Type O: Historic Buildings

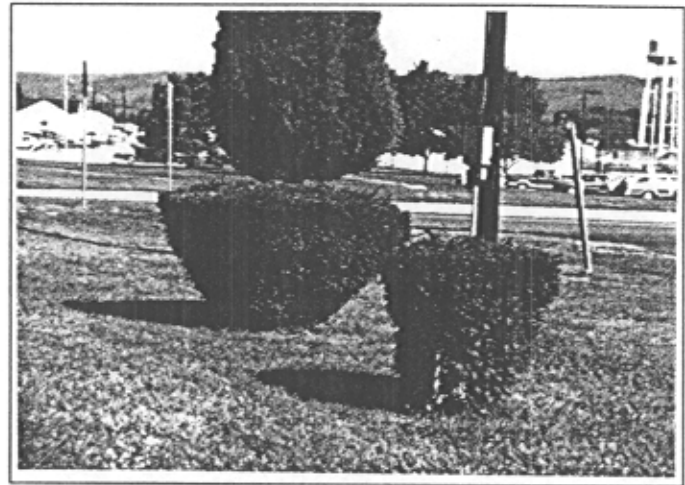


Type J Building

Plazas and Courtyards

Plazas and courtyards are the outdoor rooms that provide a transition between indoor and outdoor spaces. They can serve several functions and should relate to the scale of the buildings that form them. Entry plazas should direct and focus attention to the building's entry. Plazas are also needed as gathering places. Finally, they should link and unify groups of buildings.

At Fort Detrick, attention has not been paid to these outdoor spaces, and for the most part the outdoor space exists as leftover area rather than as a structured outdoor setting for the people at Fort Detrick.



Plants as they exist in individual balls.

Plant Materials

Street trees are a key element to defining primary streets and promoting a campuslike image. The street tree plantings at Fort Detrick are incomplete. They are established in spotty, noncontinuous locations along Porter Street, Ditto Avenue, and Randall Street.

There is a lack of variety of types of trees and the existing ones are often poorly maintained, resulting in poor growth and specimens that do not reflect or fulfill design goals.

Shrubs have not been chosen with their natural characteristics — form and size — in mind. This has resulted in the limited maintenance resources being devoted to pruning. Shrubs exist in overgrown balls that do nothing to improve the visual scene.

The family housing area has benefited from the surrounding open space and stands of mature trees. However, plants have not been used to more intimately define personal space and entries. The plants used do not contribute to the residential character of the area.

Lack of sufficient maintenance appears to be a problem that adversely affects all plantings. The overall impression in the developed sections of the main post is one of insufficient green areas.

Site Elements

Site elements are those relatively small individual elements that, as a whole, provide the opportunity to unify the visual environment. These include signs, lighting fixtures, and site furnishings. Unfortunately, there are no overall guidelines for the style and placement of site elements. As a result, they have been chosen as needed, resulting in a wide range of styles. They often are incorrectly placed and may not always be where needed. This incremental approach is a recurring theme in past development practices at Fort Detrick.

INTRODUCTION

The Department of Defense community looks to Fort Detrick, Maryland, as the world's leading microbiological containment research campus. Fort Detrick encompasses a multitude of activities and their associated missions, providing space for offices, laboratories, and advanced communications facilities for 26 tenant organizations that represent the Army, Navy, Air Force, Marine Corps, and the U.S. Department of Agriculture (USDA). The National Cancer Institute Frederick Cancer Research Center (NCI FCRC) is also a key component at this medical research and development center.

During the last two decades, Fort Detrick has emerged as a center for medical and botanical research development, with associated medical logistics and intelligence commands. In addition, it also contains a major global telecommunications center. Its land area has increased from the original 90 acres to 1,212. However, this transition in missions has largely been accommodated within existing structures so that the look or visual image of the post has not changed. As a result, the visual image projected is not in keeping with Fort Detrick's current identity.

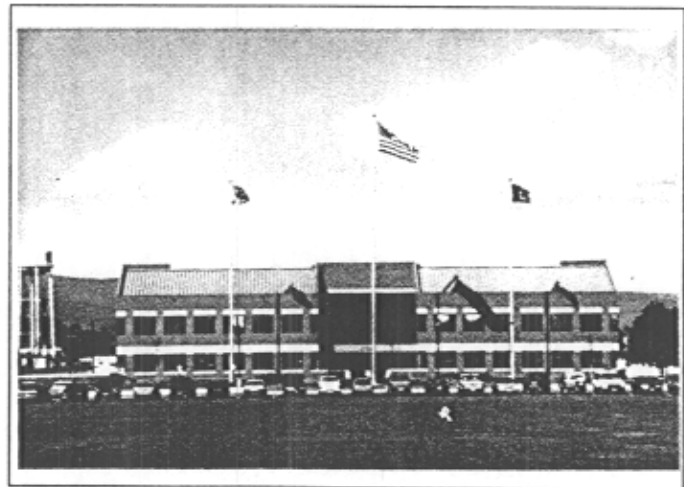
PURPOSE

The goal of the *Installation Design Guide* (IDG) is to facilitate the development of an appropriate visual image reflecting Fort Detrick's current mission. The IDG establishes guidance for the planning, design, and construction of all projects. It is a framework to guide the ongoing changes on the post, and, as such, can be a catalyst for positive change. This document provides a comprehensive set of standards and criteria for the design and development of all exterior elements. The ideas and projects presented in the IDG must be incorporated into the planning process and guide decision making. Strict adherence to the IDG is mandatory and will provide the means to establish a desired image and, as a result, improve and enhance the visual quality and character of the post over time.

- The IDG is an acknowledgment that a positive visual environment is desired at Fort Detrick. People spend as much time at their place of work as they do at home, and a positive, attractive visual environment is a component of a productive work environment. People also live on the post, and they have the right to reside in a pleasant, safe, attractive community.

- The IDG provides the principles that will guide the ongoing development of Fort Detrick's exterior environment. All individual projects must be evaluated to see how they reflect the goals of the IDG.
- The IDG shall not discourage creative planning and design by professionals using appropriate contemporary standards and criteria within the context of the installation.
- The IDG is to be utilized by the Fort Detrick military and civilian staff as well as by architects, engineers, landscape architects, contractors, and any designers who will affect the exterior features of this installation.

The contents of this document are designed to remain valid for many years and to provide flexibility so that revisions and expansions can be accommodated as the need arises.



Fort Detrick

EXECUTIVE SUMMARY

ORGANIZATION

The IDG is organized into three main sections:

1: Background, 2: Visual Zones, and 3: Design Guidelines.

Section 1: Background

This section includes: IDG Purpose and Use, History of Development, Image of Fort Detrick, Inventory and Analysis of Existing Conditions, and Conclusion. The Conclusion includes the Visual Zone Map and presents the visual theme. All of the general installation wide background information that is needed to begin exterior design, maintenance, renovation, or building is located in Section 1. This section provides the rationale and direction for the information presented in the next two sections.

Section 2: Visual Zones

This section describes the visual zones, which are areas within Fort Detrick that are visually separate or distinct due to land use, architecture, or site plan type. The zones are an organizational tool to facilitate an understanding of the visual quality of each area at Fort Detrick. This section describes each zone, identifying its location, character, assets and liabilities, and recommendations. This section is meant to serve as the definitive guide to questions related to the exterior environment within each zone.

Section 3: Design Guidelines

This section provides design guidance for the components of the exterior environment at Fort Detrick. There are written guidelines, specifications, and graphic representations for: Architecture, Roads, Parking, Paths, Plazas and Courtyards, Plant Materials, Signage, Lighting, Site Furnishings, and Security and Utilities. This section promotes a sense of continuity and visual unity for the many components of the visual environment. Individual specifications are contained on one page whenever possible, so that information may be easily removed and photocopied.

Appendix

Following the three sections is a Bibliography and a list of Abbreviations.

HOW TO USE

In order to undertake a design project, the installation will typically develop a package containing all pertinent information from each appropriate section for the persons taking the design or maintenance action. A guideline package can be custom-tailored for any project or job regardless of size by removing the needed pages, photocopying them and then returning the originals to the binder.

The guidelines package can be used to direct the installation of a single element such as a light, or it can guide an entire complex including site planning, buildings and accompanying paths, landscaping, plantings, and site furnishings. It is necessary to review the designer's conceptual plans and working drawings at the interim and final design stages. Construction of the project must also be inspected to ensure compliance with the IDG. In addition to continual monitoring throughout the development of a specific project, periodic inspections also must be conducted throughout the installation to verify proper maintenance procedures and in-house compliance with the IDG.

LIGHTING

General Principles

Lighting provides security and illumination and contributes to the aesthetic character of an area. There are certain areas, such as the Fort Detrick entry signs, security control points, and building entrances that should be well lighted. The remaining areas should be in low-ambient luminance that satisfies security requirements while contributing to the desired visual

character. The glare of intensive light sources should be eliminated by selection of appropriate fixtures and placement, or by an architectural or landscape architectural solution.

Light fixtures are needed in a wide range of instances. The scale or size of the fixture should be appropriate to its setting. In other words, a lighting fixture that would be appropriate in a parking lot would be too large along a pedestrian walkway (see Figure 3-76). Lighting fixtures must complement the color, materials, and style of the surrounding buildings or area.

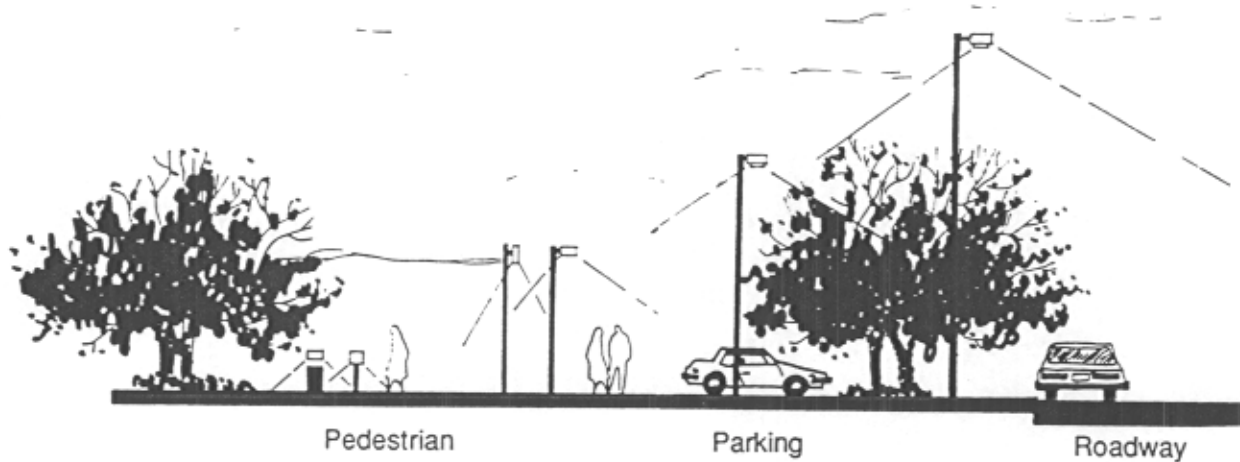


Figure 3-76: Examples of Different Lighting Uses

DESIGN GUIDELINES

Lighting

Lighting Types

Selection of the type of lighting involves trade-offs between lamp size/optical control, efficacy, appearance, color temperature, color rendering, lamp life, costs, and maintenance. See Table 3-9 for a summary of these characteristics.

Lighting Placement

In all zones, except for Family Housing and the Nallin Farm Zones, the basic "shoe box" fixture must be used. As new fixtures are needed or as older ones are replaced, the following specifications provide the particular guidelines that must be followed.

There are special fixtures for the Family Housing and Nallin Farm Zones.

The lighting fixtures in the 1110th Signal Battalion Zone are white globes on white posts. It is recommended that these fixtures be replaced with the basic "shoe box" fixture. This must be done as the existing fixtures wear out. The existing fixtures should be replaced in groups.

Lamp	Wattage range, ft	Efficacy, lumen/watt†	Average life, hrs	Apparent color	Color rendering	Initial cost of equipment
Incandescent	10-1000	10-25	750-2000	Warm white	Best overall	Low
Fluorescent	15-215	40-80	7500-15,000	Warm to cool white	Good	Medium
Mercury vapor (deluxe white)	40-1000	25-60	24,000	Cool white	Good	Medium
Metal halide	175-1500	65-105	7500-20,000	Cool white	Very good	Medium to high
High-pressure sodium (STP)	35-1000	60-120	—	Yellowish	Poor	High
High-pressure sodium (deluxe color)	150-250	75-80	—	Warm white	Very good	High
Low-pressure sodium	18-180	70-150	—	Yellow-orange	Very poor	High

* Data current at time of writing. Technological improvements are anticipated to be centered on the metal halide and deluxe color high-pressure sodium lamp families.

† Includes ballast losses.

from *Time Saver Standards for Landscape Architecture*, Harris & Dines, p. 540-6.

Table 3-9: Comparison of Lighting Characteristics

Standard Roadway Light Fixture

Housing: Extruded aluminum (see Figure 3-77).

Shape: Basic "shoe box", 20" x 25" x 8".

Pole: Square, straight aluminum, 30'-0" high, 80-mph wind load plus 1.3 gust factor.

Finish: Baked enamel, dark bronze.

Lamp: High-pressure sodium, 400 watts.

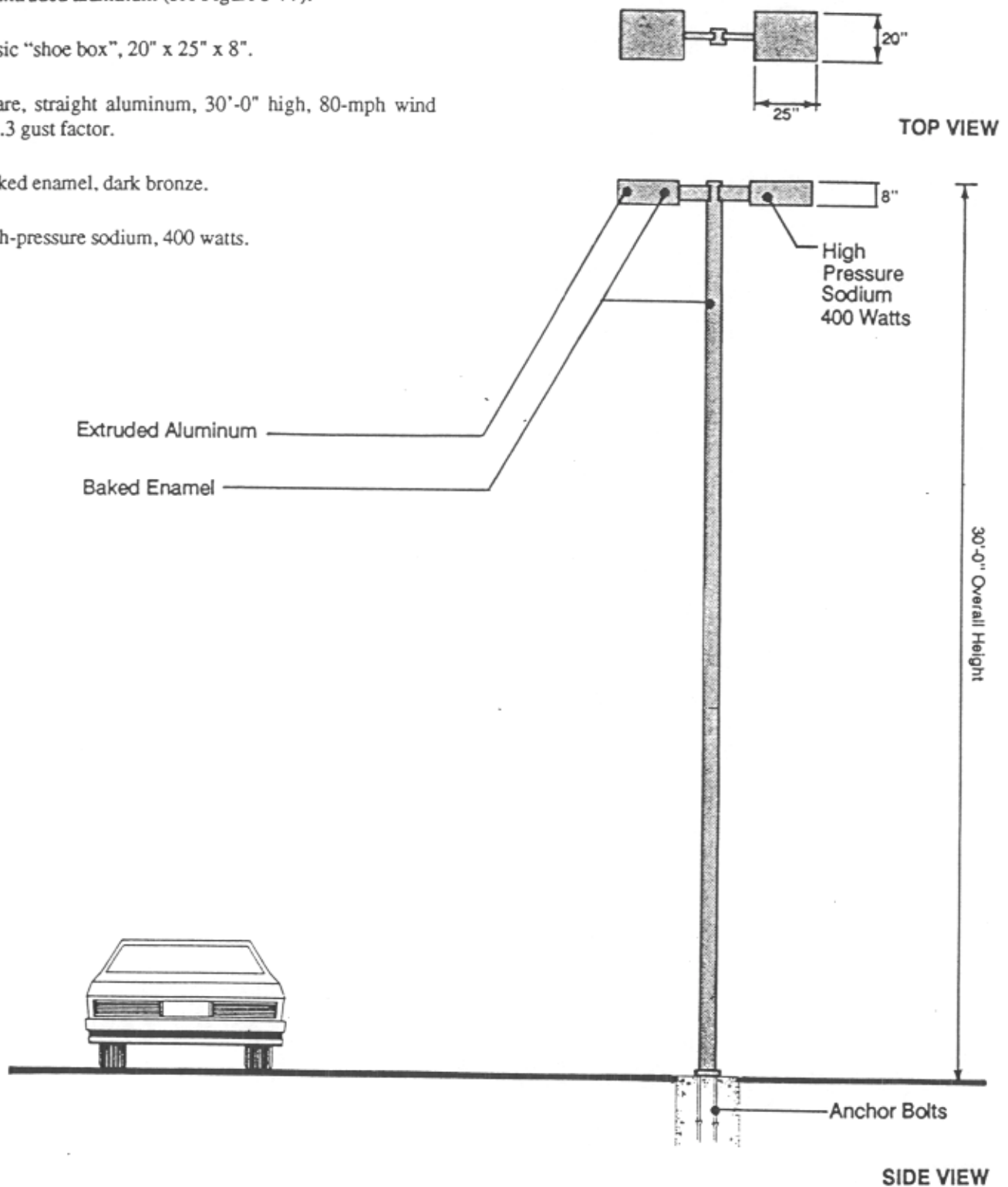


Figure 3-77: Standard Roadway Light Fixture

DESIGN GUIDELINES

Lighting

Standard Parking Lot Light Fixture

Housing: Extruded aluminum (see Figure 3-78).

Shape: Basic "shoe box", 20" x 25" x 8".

Pole: Square, straight aluminum, 20'-0" high, 80- mph wind load plus 1.3 gust factor.

Finish: Baked enamel, dark bronze.

Lamp: High-pressure sodium, 400 watts.

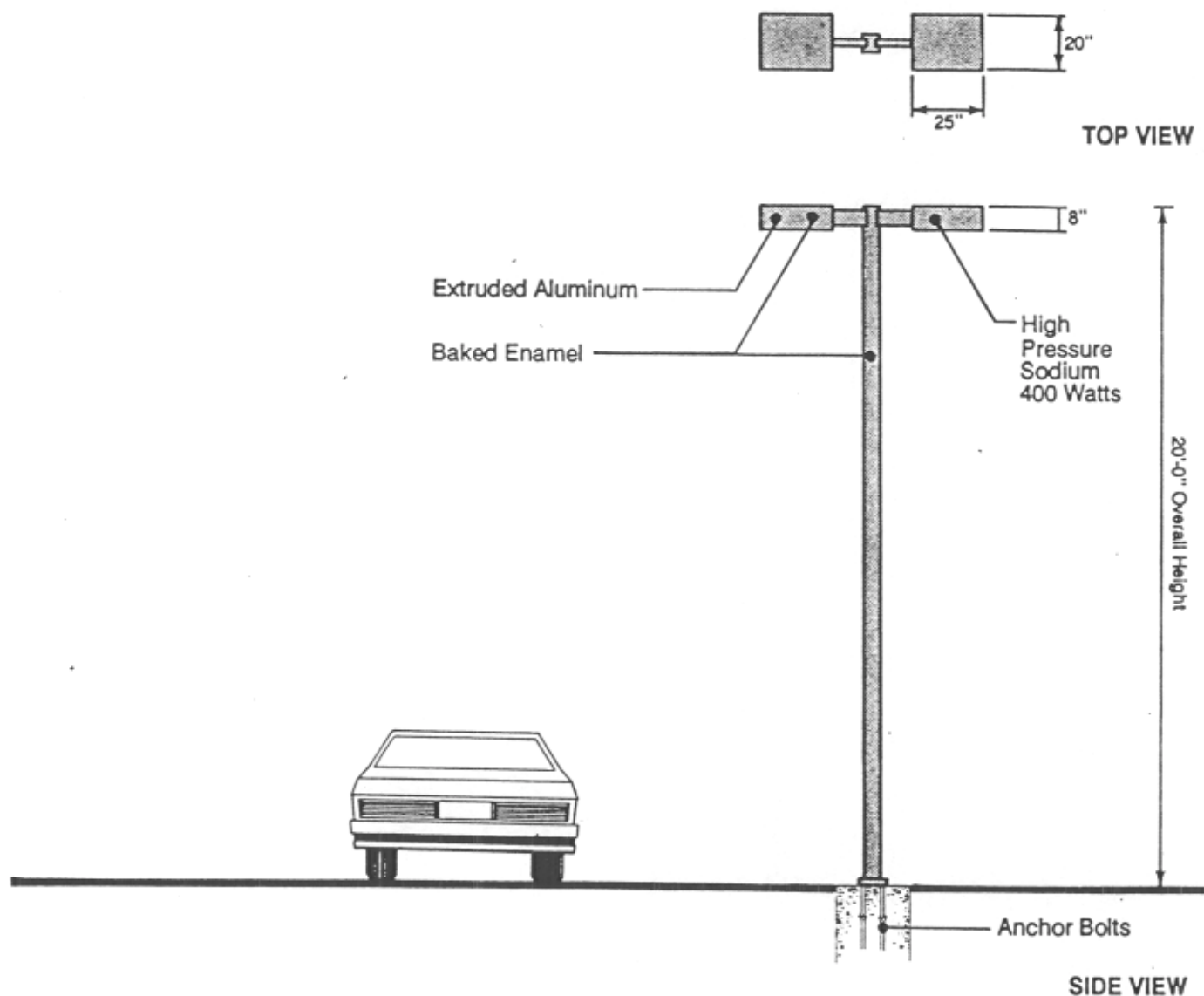


Figure 3-78: Standard Parking Lot Light Fixture

Standard Walkway Light Fixture

Housing: Extruded aluminum (see Figure 3-79).

Shape: Basic "shoe box", 16" x 20" x 6".

Pole: Square, straight aluminum, 10'-0" to 15'-0" high, 80-mph wind load plus 1.3 gust factor.

Finish: Baked enamel, dark bronze.

Lamp: High-pressure sodium, 250 watts.

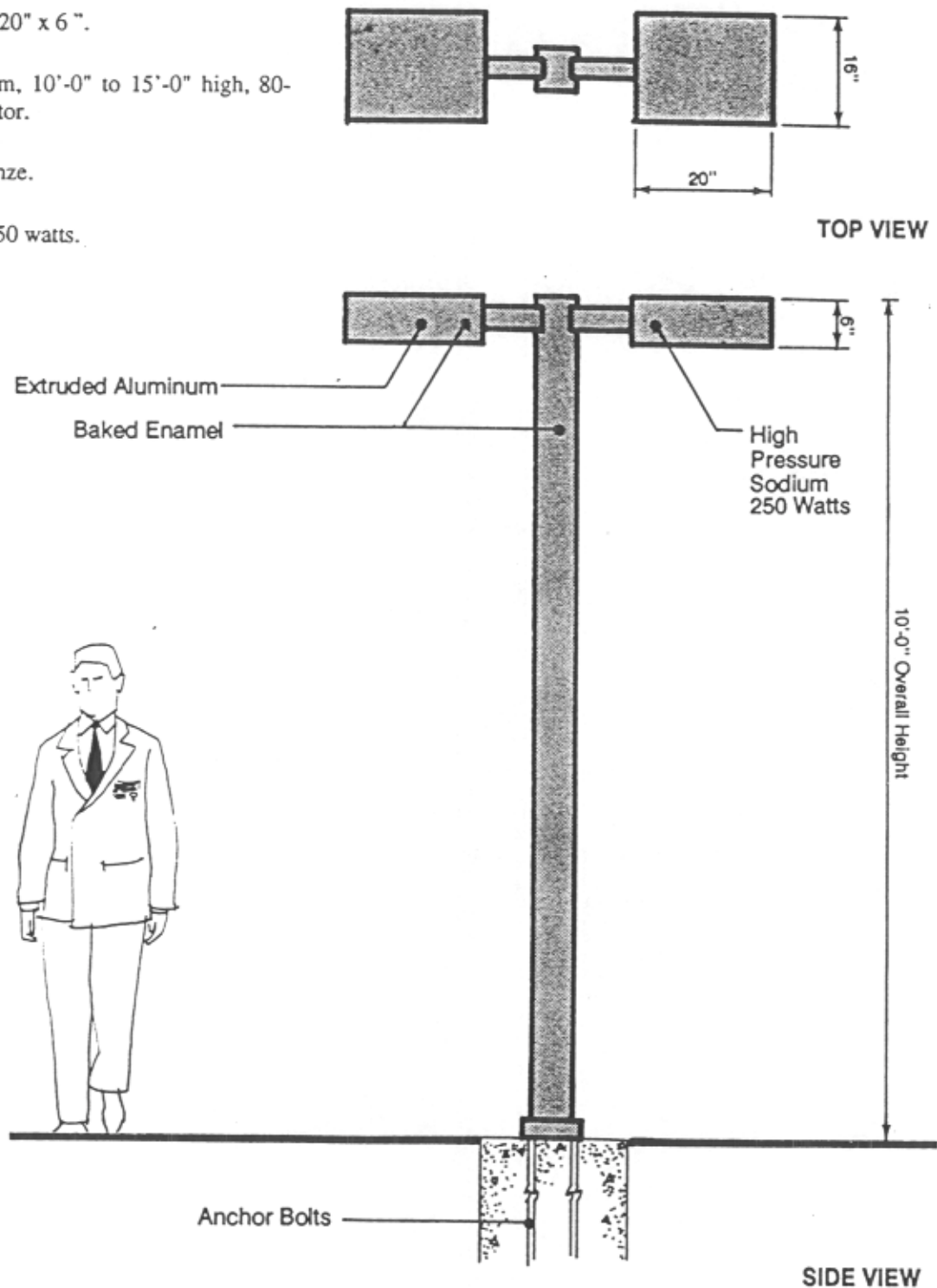


Figure 3-79: Standard Walkway Light Fixture

DESIGN GUIDELINES

Lighting

Standard Bollard Light Fixture

Housing: Extruded aluminum (see Figure 3-80).

Shape: 8" x 8" x .188"-thick wall, standard height of 42" overall.

Finish: Baked enamel, dark bronze.

Anchor: Anchor bolted to surface (3/8" x 18" on 4.5" bolt circle).

Lamp: High-pressure sodium, 70 watts.

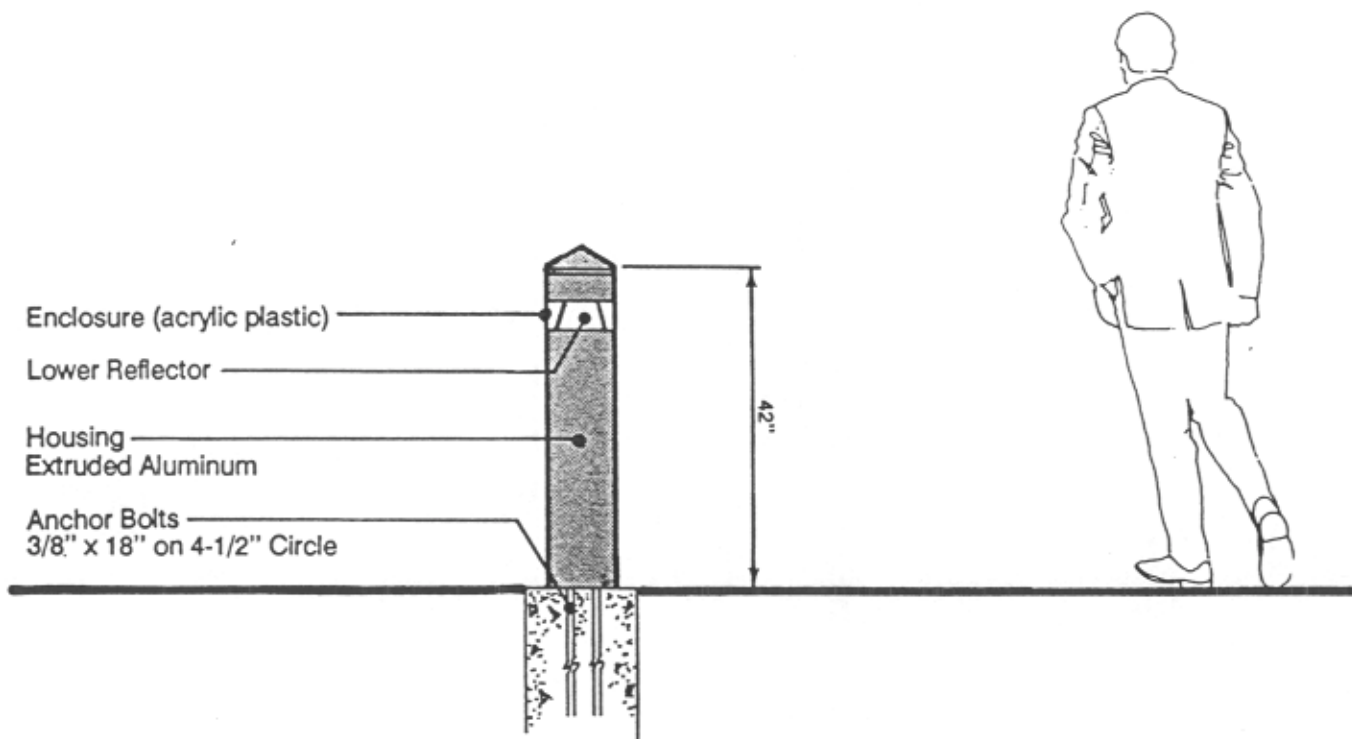


Figure 3-80: Standard Bollard Light Fixture

Residential Roadway Light Fixture

In the Family Housing and Nallin Farm Zones, the following specifications give the particular guidelines that must be followed when selecting fixtures (see Figure 3-81).

Housing: Cast aluminum; spun-aluminum shade with rolled edge.

Pole: Tapered, round, 19'-8".

Finish: Multilayered hard acrylic enamel.

Color: Black with inside of reflector painted white.

Lamp: 100 watt, metal halide, opal glass with screw neck.

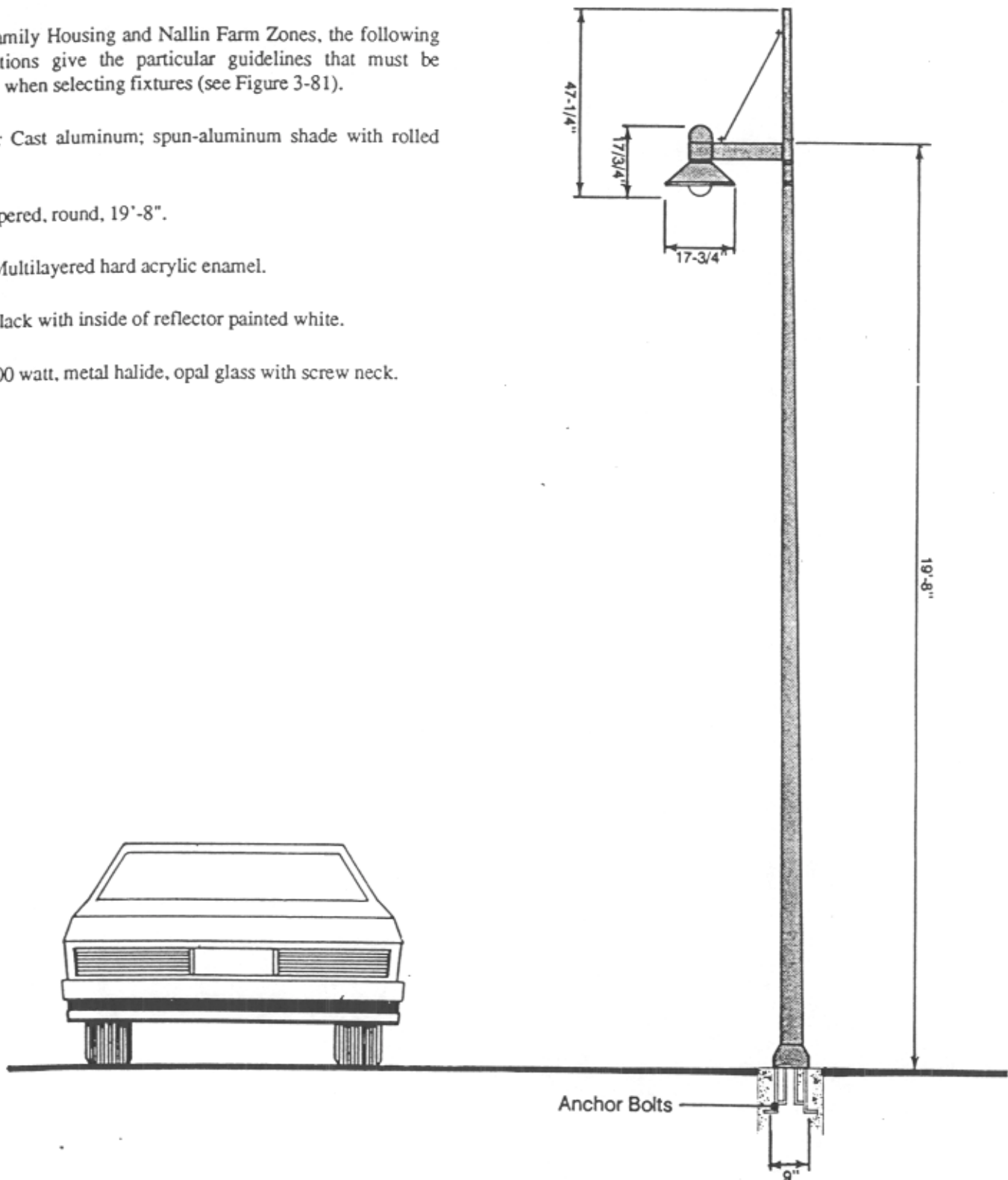


Figure 3-81: Residential Roadway Light Fixture

DESIGN GUIDELINES

Lighting

Residential Parking Lot/Walkway Light Fixture

In the Family Housing and Nallin Farm Zones, the following specifications give the particular guidelines that must be followed when selecting fixtures (see Figure 3-82).

Housing: Cast aluminum, spun-aluminum shade with rolled edge.

Pole: Tapered round, 7'-8" height.

Finish: Multilayered hard acrylic enamel.

Color: Black with inside of reflector painted white.

Lamp: 9 watt PLC, compact double twin-tube fluorescent lamp, opal glass with screw neck (Osram DD-085 operable to 5 degrees F).

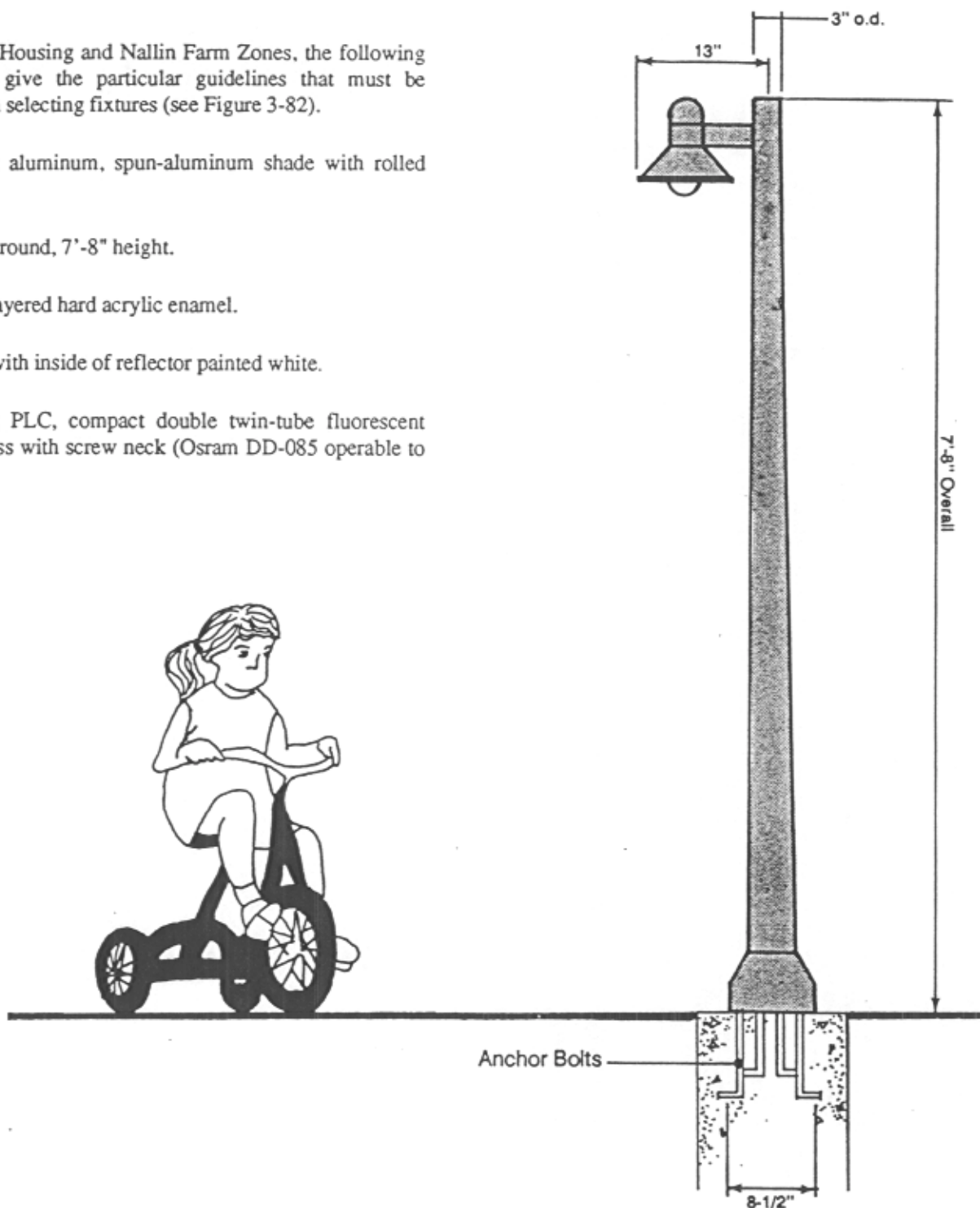


Figure 3-82: Residential Parking Lot/Walkway Light Fixture

Residential Bollard Light Fixture

In the Family Housing and Nallin Farm Zones, the following specifications give the particular guidelines that must be followed when selecting fixtures (see Figure 3-83).

Housing: Cast aluminum, spun-aluminum shade with rolled edge.

Finish: Multilayered hard acrylic enamel.

Color: Black with inside of reflector painted white.

Pole: Straight, round, 47" height.

Lamp: 9 watt, PLC compact double twin-tube fluorescent lamp, opal glass, with screw neck (Osram DD-085 operable to 5 degrees F).

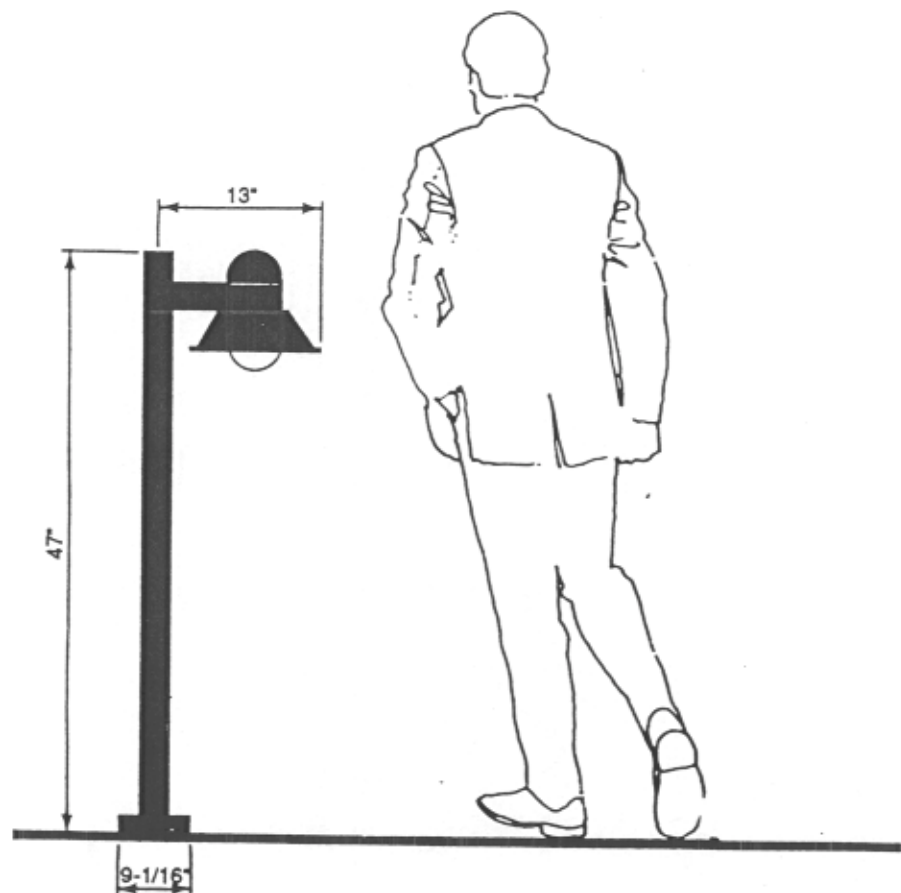


Figure 3-83: Residential Bollard Light Fixture

DESIGN GUIDELINES

Lighting

Residential Wall-mounted Light Fixture

In the Family Housing and Nallin Farm Zones, the following specifications give the particular guidelines that must be followed when selecting fixtures (see Figure 3-84).

Housing: Cast aluminum, spun-aluminum shade with rolled edge.

Finish: Multilayered hard acrylic enamel.

Color: Black with inside of reflector painted white.

Lamp: 9 watt, PLC compact double twin-tube fluorescent lamp, opal glass with screw neck (Osram DD-085 operable to 5 degrees F).

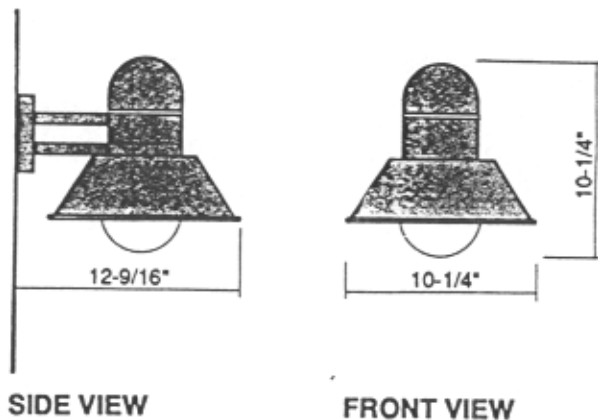


Figure 3-84: Residential Wall-mounted Light Fixture

SECTION 01012

DESIGN AFTER AWARD

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

The Contractor shall schedule the number and composition of the design submittal phases. All design submittals shall be in english units. Design submittals are required at the concept (10%), preliminary (50%) and final (95%) design stages and at the design complete stage (100%). The requirements of each design stage are listed hereinafter. The Contractor shall reflect the number and contents of the design submittals phases in the progress charts. As a maximum, the 10%, 50%, 95% and 100% complete design submittals shall be made in only one package for each of the fifteen (15) major categories listed in Paragraph, "Contents of Design Submittals," except the foundation design, utilities under the slab (all utilities together as one submittal), the Structural Interior Design (SID), and long lead item submittals. These exceptions may be in addition to the 15 major submittals. More than one category may be combined in a submittal.

1.2 DESIGNER OF RECORD

The Contractor shall identify a Designer of Record ("DOR") for each area of design. All design disciplines shall be accounted for by listed, registered Designer(s) of Record. Each DOR shall be responsible for ensuring integrity of their design and design integration in all construction submittals and extensions to design developed by others, such as the constructor, subcontractors or suppliers. The DOR shall review and approve all construction submittals and extensions to design, in accordance with the procedures, described in Section 01330 SUBMITTALS PROCEDURES FOR DESIGN BUILD. Each DOR shall be responsible for the responses to "Requests for Information" ("RFI's"), applicable to their area of design responsibility. Each DOR shall stamp, sign, and date all design drawings under their responsible discipline at each design submittal stage and all submittals under their responsible discipline, in accordance with the submittal review procedures. The DOR shall sign-off on all applicable RFI responses. "

1.3 CONSTRUCTOR'S ROLE DURING DESIGN

The Contractor's construction management key personnel shall be actively involved during the design process to effectively integrate the design and construction requirements of this contract. In addition to the typical required construction activities, the constructor's involvement includes, but is not limited to actions such as: integrating the design schedule into the Master Schedule to maximize the effectiveness of fast-tracking design and construction (within the limits allowed in the contract), ensuring constructability and economy of the design, integrating the shop drawing and installation drawing process into the design, executing the

material and equipment acquisition programs to meet critical schedules, effectively interfacing the construction QC program with the design QC program, and maintaining and providing the design team with accurate, up-to-date redline and as-built documentation. The Contractor shall require and manage the active involvement of key trade subcontractors in the above activities, as appropriate, if subcontracts have been awarded.

1.4 STAGES OF DESIGN SUBMITTALS

1.4.1 Concept Design Review Submittal (10%)

The review of this submittal is primarily to ensure that the Contractor is working towards a site layout that is acceptable to the Government and meets the site constraints imposed. The submittal shall consist of the following:

Architectural Floor Plan

Site Layout Plan: Show the proposed building footprint, proposed roads, and parking lots containing the required spaces; drawing shall be shown to scale on the provided survey drawing.

1.4.2 Preliminary Design Review Submittal (50%)

The review of this submittal is primarily to insure that the contract documents and design analysis are proceeding in a timely manner and that the design criteria is being correctly interpreted. The submittal shall consist of the following:

Design analysis, developed to 50%

50% complete drawings

CADD files of all drawings (2 copies)

Structural Interior Design (SID) Package

Environmental permits, as required. When environmental permits are not required, the Contractor shall provide a statement with justification to that effect.

1.4.3 Final Design Review Submittal (95%)

The review of this submittal is to insure that the design is in accordance with directions provided the Contractor during the design process. The Contractor shall submit the following documents for Final Design Review:

Applicable design analysis, developed to 95%

95% complete drawings

Draft specifications

Annotated 50% review comments

The Design Analysis submitted for Final Design Review shall be in its final form. The Design Analysis shall include all backup material previously submitted and revised as necessary. All design calculations shall be included. The Design Analysis shall contain all explanatory material giving the design rationale for any design decisions which would not be obvious to an engineer reviewing the Final Drawings and Specifications.

The Contract Drawings submitted for Final Design Review shall include the drawings previously submitted which have been revised and completed as necessary. The Contractor is expected to have completed all of his coordination checks and have the drawings in a design complete condition. The drawings shall be complete at this time including the incorporation of any design review comments generated by the Preliminary design review. The drawings shall contain all the details necessary to assure a clear understanding of the work throughout construction. Shop drawings will not be considered as design drawings. All design shall be shown on design drawings prior to submittal of shop drawings.

The Draft Specifications on all items of work submitted for Final Design Review shall consist of legible marked-up specification sections.

The Contractor may begin construction on portions of the work for which the Government has reviewed the Final Design Submission and has determined satisfactory for purposes of beginning construction. The Contracting Officer Representative (COR) will notify the Contractor when the design is cleared for construction. The Government will not grant any time extension for any design resubmittal required when, in the opinion of the COR, the initial submission failed to meet the minimum quality requirements as set forth in the Contract.

1.4.4 Design Complete Submittal

After the Final Design Review, the Contractor shall revise the Contract Documents by incorporating any comments generated during the Final Design Review and shall prepare final hard copy Contract Specifications. The Contractor shall submit the following documents for the design complete submittal:

Design analysis, in final 100% complete form

100% complete drawings

Final specifications

Annotated 95% review comments

CADD files of all drawings (2 copies)

Structural Interior Design (SID) Package

Cals Files

The Contractor shall submit the Design Complete Submittal not later than 14

calendar days after the Government returns the annotated Final Design Review Submittal.

If the Government allows the Contractor to proceed with limited construction based on pending minor revisions to the reviewed Final Design submission, no payment will be made for any in-place construction related to the pending revisions until they are completed, resubmitted with the Design Complete Submittal and are satisfactory to the Government.

1.5 QUANTITY OF DESIGN SUBMITTALS

1.5.1 General

The documents which the Contractor shall submit to the Government for each submittal are listed and generally described hereinafter. Unless otherwise indicated, the Contractor shall submit five (5) copies of each item required to be submitted at the Preliminary and Final Design Review Submittal stages. The quantities of this item are indicated with the description of the item. All drawings for review submittals shall be half-size blue lines. At the Design Complete Submittal, the Contractor shall also submit five (5) complete full size sets of drawings, five (5) complete half size sets and two copies of CADD files in AutoCADD Release 2000 format, five (5) sets of the specifications and two (2) copies on floppy disks in word.

1.6 MAILING OF DESIGN SUBMITTALS

Mail all design submittals to the Government during design and construction, using an overnight mailing service. The Government will furnish the Contractor addresses where each copy shall be mailed to after award of the contract. The submittals shall be mailed to four (4) different addresses as directed by the Government.

Each design submittal shall have a transmittal letter accompanying it indicating the date, design percentage, type of submittal, list of items submitted, transmittal number and point of contact with telephone number.

1.7 COORDINATION

1.1.7.1 Written Records

Provide a written record of each design site visit, meeting, or conference, either telephonic or personal, and furnish within five (5) working days copies to the Contracting Officer and all parties involved. The written record shall include subject, names of participants, outline of discussion, and recommendation or conclusions. Number each written record for the particular project under design in consecutive order.

1.7.2 Design Needs List

Throughout the life of his contract the Contractor shall furnish the COR a biweekly "needs" list for design related items. This list shall itemize in an orderly fashion design data required by the Contractor to advance the design in a timely manner. Each list shall include a sequence number,

description of action item, name of the individual or agency responsible for satisfying the action item and remarks. The list will be maintained on a continuous basis with satisfied action items checked off and new action items added as required. Once a request for information is initiated, that item shall remain on the list until the requested information has been furnished or otherwise resolved. Copies of the list will be mailed to the Contracting Officer (COR).

1.8 GOVERNMENT REVIEW COMMENTS

Within 21 days after Notice to Proceed, the Contractor shall submit, for approval, a complete design schedule with all submittals and review times indicated in calendar dates. The Contractor shall update this schedule monthly.

After receipt, the Government will be allowed thirty (30) days to review and comment on each 10% and 50% design submittal and twenty-one (21) days to review and comment on each 95% design submittal, except as noted below. For each design review submittal, comments from the various design sections and from other concerned agencies involved in the review process will be provided using the on-line DrChecks Review Management System. The contractor shall respond to the comments using the same system. The DrChecks Review Management System is available at the internet address "65.204.17.188". The contractor shall call Jean Swalley at 1-410-962-4153 for instructions for registering and using the system. The review will be for conformance with the technical requirements of the solicitation and the Successful Officer's (Contractor's) RFP proposal. If the Contractor disagrees technically with any comment or comments and does not intend to comply with the comment, he must clearly outline, with ample justification, the reasons for noncompliance within five (5) days after receipt of these comments in order that the comment can be resolved. The Contractor shall furnish disposition of all comments, in writing, with the next scheduled submittal. The Contractor is cautioned in that if he believes the action required by any comment exceeds the requirements of this contract, that he should take no action and notify the COR in writing immediately. Review conferences will be held for each design submittal at Ft. Meade, MD. The Contractor shall bring the personnel that developed the design submittal to the review conference. These conferences will take place the week after the twenty-one (21) day review period.

If a design submittal is over one day late in accordance with the latest design schedule, the Government review period will be extended 7 days. The review conference will be held the week after the review new period. Submittals date revisions must be made in writing five (5) days prior to the effect submittal.

1.9 DESIGN ANALYSIS

1.9.1 Media and Format

Present the design analysis on 8-1/2-inch by 11-inch paper except that larger sheets may be used when required for graphs or other special calculation forms. All sheets shall be in reproducible form. The material may be typewritten, hand lettered, handwritten, or a combination thereof,

provided it is legible. Side margins shall be 1-inch minimum to permit side binding and head to head printing. Bottom margins shall be 1-1/4-inches, with page numbers centered 1 inch from the bottom.

1.9.2 Organization

Assign the several parts and sheets of the design analysis a sequential binding number and bind them under a cover indicating the name of the facility and project number, if applicable. The title page shall carry the designation of the submittal being made. The complete design analysis presented for final review with the final drawings and specifications shall carry the designation "FINAL DESIGN ANALYSIS" on the title page.

1.9.3 Design Calculations

Design calculations are a part of the design analysis. When they are voluminous, bind them separately from the narrative part of the design analysis. Present the design calculations in a clean and legible form incorporating a title page and index for each volume. Furnish a table of contents, which shall be an index of the indices, when there is more than one volume. Identify the source of loading conditions, supplementary sketches, graphs, formulas, and references. Explain all assumptions and conclusions. Calculation sheets shall carry the names or initials of the computer and the checker and the dates of calculations and checking. No portion of the calculations shall be computed and checked by the same person.

1.9.4 Automatic Data Processing Systems (ADPS)

When ADPS are used to perform design calculations, the design analysis shall include descriptions of the computer programs used and copies of the ADPS input data and output summaries. When the computer output is large, it may be divided into volumes at logical division points. Precede each set of computer printouts by an index and by a description of the computation performed. If several sets of computations are submitted, they shall be accompanied by a general table of contents in addition to the individual indices. Preparation of the description which must accompany each set of ADPS printouts shall include the following:

Explain the design method, including assumptions, theories, and formulas.

Include applicable diagrams, adequately identified.

State exactly the computation performed by the computer.

Provide all necessary explanations of the computer printout format, symbols, and abbreviations.

Use adequate and consistent notation.

Provide sufficient information to permit manual checks of the results.

1.10 DRAWINGS

Prepare all drawings on Computer-Aided Design and Drafting (CADD) so that they are well-arranged and placed for ready reference and so that they present complete information. The Contractor shall prepare the drawings with the expectation that the Corps of Engineers, in the role of supervision, will be able to construct the facility without any additional assistance from the Contractor. Drawings shall be complete, unnecessary work such as duplicate views, notes and lettering, and repetition of details shall not be permitted. Do not show standard details not applicable to the project, and minimize unnecessary wasted space. Do not include details of standard products or items which are adequately covered by specifications on the drawings. Detail the drawings such that conformance with the RFP can be checked and to the extent that shop drawings can be checked. Do not use shop drawings as design drawings. The Contractor shall use standard Corps of Engineers title blocks and borders on all drawings. An index of drawings shall be included with each submittal. The COE will furnish the Contractor drawing numbers for inclusion in the title blocks of the drawings.

All CADD drawings shall be prepared in accordance with the applicable provisions of the "CENABEN Contract Clauses for CADD Deliverables".

The Contract Clauses, Standard border sheets, etc. are available at the NABEN web page: <http://www.en.nab.usace.army.mil/> or by request on CD ROM.

All drawings, specifications, notes, and other works developed in the performance of this contract shall become the sole property of the Government and may be used on any other design without additional compensation to the Contractor. The Government shall be considered the "person for whom the work was prepared". With respect thereto, the Contractor agrees not to assert or authorize others to assert any rights or to establish any claim under the design patent or copyright laws. The Contractor for a period of three (3) years after completion of the project agrees to furnish all retained works on the request of the Contracting Officer. Unless otherwise provided in the contract, the Contractor shall have the right to retain copies of all works beyond such period.

1.11 SPECIFICATIONS

The Contractor shall submit marked-up and final specifications as required.

The specifications shall be edited in SPECSINTACT available on the internet at "<http://si.ksc.nasa.gov/specsintact>" and shall use Uniform Facilities Guide Specifications available from CCB at "<http://www.ccb.org/ufigs/ufigs.htm>". Edit the specifications for this project and submit in marked-up or redlined draft version at the Final Review submittal stage. If the design is based on a specific product, the specifications shall consist of the important or salient features of the product. The specifications shall be detailed enough such that another product meeting the specifications could be substituted and it would not adversely impact the project. After incorporation of comments, submit a final, design complete specification package. Submit one (1) original hard copy set of the specifications and a copy on floppy disks in pdf format (via Adobe Acrobat software - see <http://www.adobe.com/products/acrobat/>). Delete all marked-out or redlined text and type in all inserted text.

1.11.1 Submittal Register

Develop the submittal requirements during the design phase of the contract, by producing a Contractor Submittal Register during design. Attach a submittal register to each section of the specifications for the submittal requirements of that section. Prepare the Submittal Register on ENG Form 4288. Proper tagging of SPECSINTACT prepared specifications allows this form to be generated at printing. The Contractor shall maintain a submittal register for the project in accordance with Section 01312 QUALITY CONTROL SYSTEM (QCS). The Contractor shall be responsible for listing all required submittals necessary to insure the project requirements are complied with. The Register shall identify submittal items such as shop drawings, manufacturer's literature, certificates of compliance, material samples, guarantees, test results, etc. that the Contractor shall submit for review and/or approval action during the life of the construction contract. The Contractor shall place all the Submittal Register pages in an appendix of the final specifications.

1.12 CONTENTS OF DESIGN SUBMITTALS

1.12.1 10% Submittals

The 10% design submittals shall contain as a minimum, the following:

1.12.1.1 Site Layout Plan

The Contractor shall provide a site layout plan showing the proposed layout of the building, roads, parking areas and retaining walls, etc. The plan shall be provided to scale with the survey provided to the Contractor. While a grading plan is not required at this stage, the submittal should as a minimum demonstrate the intended drainage patterns and the requirements for major cut and fill or retaining structures. The intent of this submission will be to sufficiently demonstrate that the required functions of the site can be met within the site constraints given, in a layout that is acceptable to the government. The submittal will include an explanation of objectives and factors influencing siting decisions and a general overview of major site features planned, such as building orientation, drainage patterns, parking provisions, traffic circulation including delivery access, provisions for the handicapped and security requirements, etc.

1.12.1.2 Architectural Floor Plan

The Contractor shall provide a floorplan of the building showing the proposed room locations and entrances, including any required for delivery, etc.

1.12.1.3 Architectural Elevations

The Contractor shall provide building elevations showing the proposed finish materials, roof, windows and doors, unique architectural features, etc.

1.12.2 50% Design Submittals

The 50% design submittals shall contain as a minimum, the following:

1.12.2.1 Site Development

A. Design Analysis: A narrative description of siting requirements for roads, streets, parking facilities, earthwork, utilities and other related site aspects and how you plan to comply with the requirements. This is an excellent way for the designer to explain the rationale for the designs shown on the drawings. The submission of this document, prepared in accordance with ER 1110-345-700, usually eliminates numerous review comments. The design analysis should address all site aspects, and in particular storm water management and erosion and sedimentation control (designer should contact the State and local governments for their requirements) and the following:

- (1) Orientation: Architectural and Engineering Instructions, paragraph 5b, page 3-12, states, "Buildings will be oriented to take advantage of passive solar heating and cooling. Buildings eligible for air-conditioning should be sited so that the long axis of the building is in an east-west plane. Deviations are permitted where detailed solar studies indicate an alternate orientation is more energy efficient; where the topography does not allow proper orientation and there are no viable alternate sites; or where a building is to be heated by solar radiation and an alternate orientation is required for maximum solar exposure." Fully explain the building orientation in the design analysis.
- (2) Storm Drainage: Present the design of all new storm drainage and an analysis of the existing storm drainage to which the new system will be connected, if applicable. The storm drain design shall be based on the 10-year frequency event.
- (3) Roof Drainage: Design the roof drainage system in accordance with the National Plumbing Code. Collection of all roof drain downspouts which discharge on to paved areas in an underground piping system is preferred in order to avoid icing problems for pedestrians in winter weather. Coordinate the interior roof drainage system with all other design disciplines so as to avoid conflict of piping with the HVAC, sprinkler, and structural components.
- (4) Sanitary Sewers: Provide a description of existing and proposed sanitary sewer facilities and supporting design computations.
- (5) Water Service: Provide a description of existing and proposed water service for the proposed facility. Adequacy of existing system and additions required to properly service and provide fire protection for the new facility should be included.
- (6) Erosion and Sedimentation Control and Stormwater Management: Include a description of erosion and sediment control and storm water management requirements and how they will be designed.

B. Drawings should include:

- (1) Survey Plan
- (2) Demolition Plan: Clearly indicate with a legend items to be removed, abandoned and relocated. An asbestos and lead paint survey should be conducted where demolition work is required.
- (3) Grading Plan: Information shown on this plan should include:
 - a. Existing topography including contours with sufficient spot elevations to establish existing ground surface in high and low areas. Existing buildings, roads, streets, parking areas, storm drains, sanitary sewers, water lines, gas lines, steam lines, etc., to remain from the survey. In addition, show and identify the survey base line and bench mark information.
 - b. New buildings, roads, parking facilities, etc.
 - c. New grading including the finish floor elevations for all new buildings and other structures with contours and/or spot elevations in sufficient detail to develop the drainage pattern as well as earthwork quantities.
 - d. Indicate locations of all inlets, storm and sanitary manholes, water valves, electric manholes and other utility structures visible at grade on the plan. Do not show any new utility lines serving the utilities.
 - e. Show storm water management detention areas.
- (4) Utilities Plan: This plan should show all existing and new utilities including but not limited to sanitary sewers, force mains, water lines, storm drainage, roof drains, gas lines, subdrainage, and foundation drains. All electrical and telephone lines are usually shown on the electrical utility plan. Show all new and existing buildings, roads, parking areas etc., but not contours or spot elevations. The plan should clearly present:
 - a. Existing and new sanitary sewers and force mains including manhole and cleanout locations. The size of all sanitary sewers and force mains should be shown. See TM 5-814-1 for technical guidance.
 - b. Existing and new water distribution and service lines with valves and fire hydrants indicated. Show sizes of all service and distribution lines. See TM-813-5 and TM 5-813-6 for technical guidance.
 - c. Existing and new storm drainage system and roof drainage with inlets, manholes, and headwalls indicated. The size of storm drains should be shown. See TM 5-820-4 for storm drainage technical guidance and the National Plumbing Code for

roof drainage.

d. Show existing and new steam lines or gas line distribution and service lines with valves.

e. All utilities which are to be abandoned, relocated, or removed and sanitary, water and storm drainage piping to be abandoned shall be capped or plugged with a minimum of 1 foot of concrete. If a demolition plan is included, demolition of utilities does not have to be shown on the utility plan.

(5) Layout Plan: This plan should show all layout dimensions for all new features. Clearly identify all construction base lines used to layout and space the new work. The use of coordinates for locating new features is acceptable but not preferred over base line layouts. Depending upon the size of the project the layout data may be shown on the Utilities Plan. If the project has numerous utilities then prepare a separate layout plan to avoid congested drawings.

(6) Erosion and Sedimentation Control Plan: This plan should show all temporary erosion and sediment control measures for the construction activity. The plan shall be developed in accordance with paragraph 6 of this document.

C. Outline Specifications: Appropriate guide specifications shall be selected and listed for the aspects of the project. A complete list of current Uniform Facilities Guide Specifications is available on the internet as specified in paragraph: SPECIFICATIONS.

1.12.2.2 Geotechnical

A geotechnical report and design analysis.

Anticipated permit requirements for water and wastewater features.

1.12.2.3 Landscape, Planting and Turfing

The landscape planting design narrative shall describe the analysis of existing site conditions, including an indication of existing plant materials that are to remain on the site. The statement of concept shall indicate specific site problems related to proposed development and the rationale for proposed plant locations. The narrative shall also include a list of suggested types and sizes of plant materials which are to be used, based upon the designated functional and visual criteria.

The concept drawings shall be prepared at a scale which corresponds with the site layout and grading plans and, likewise, shall include reference coordinates, north arrows, graphic scales and appropriate legends. An overall planting layout shall be developed and shall include enlarged detail plans of specific areas, as needed, to clarify requirements. The proposed layout shall indicate shade trees, evergreen trees, flowering trees, shrub masses, etc., according to designated functional and visual locations of planting. A legend which also indicates sizes of plants

recommended for each of the above categories shall be included. The drawings and all subsequent plans shall indicate existing and proposed buildings, paved areas, signs, light standards, transformers, dumpster areas, storm drainage system, and other structures and utilities.

1.12.2.4 Architectural

Design narrative shall provide a summary of functional space relationships, as well as circulation. There shall also be a general statement for the rationale behind the major design decisions.

Plans shall indicate dimensions, columns lines, and detail references. Toilets and other specialized areas shall be drawn to 1/4" scale and shall show any needed interior features.

Finish schedule shall indicate material, finishes, colors and any special interior design features such as soffits, fascias, and lighting troughs, etc.

All required furniture and equipment shall be shown on the drawings with an equipment list.

List any special graphics requirements that will be provided.

Schedules shall be provided for both doors and windows. These schedules shall indicate sizes, types, and details for all items shown on floor plans.

Hardware sets using Builder's Hardware Manufacture's Association (BHMA) designations.

Composite floor plan showing all prewired work stations. Also show typical elevations of each type of work station.

Fire protection plans and analysis.

1.12.2.5 Structural Design

State the live loads to be used for design. Include roof and floor loads; wind loads, lateral earth pressure loads, seismic loads, etc., as applicable.

Describe the method of providing lateral stability for the structural system to meet seismic and wind load requirements. Include sufficient calculations to verify the adequacy of the method.

Furnish calculations for all principal roof, floor, and foundation members.

This submittal shall include drawings showing roof and floor framing plans as applicable. Principal members will be shown on the plans. A foundation plan shall also be furnished showing main footings and grade beams where applicable. Where beam, column, and footing schedules are used, show schedules and fill in sufficient items to indicate method to be used. Show typical bar bending diagram if applicable. Typical sections shall be furnished for roof, floor, and foundation conditions. Structural drawings

for proposals and submittals shall be separate from architectural drawings.

Provide the results of any computer used for structural design. All programs shall be widely accepted and commercially available. Complete documentation is required.

1.12.2.6 Plumbing

List all references used in the design including Government design documents and industry standards.

Provide justification and brief description of the types of plumbing fixtures, piping materials and equipment proposed for use.

Prepare detail calculations for systems such as sizing of waste and water piping; water heaters and pumps.

Indicate locations and general arrangement of plumbing fixtures and major equipment.

Include plan and isometric riser diagrams of all areas including hot water, cold water, waste and vent piping. Piping layouts and risers should also include natural gas, and radon piping (as required).

Include equipment and fixture schedules with descriptions, capacities, locations, connection sizes and other information as required.

1.12.2.7 Fire Protection System

List all references used in the design including Government design documents and industry standards.

Classify each building in accordance with fire zone, building floor areas, and height and number of stories.

Discuss and provide description of required fire protection including extinguishing equipment, detection equipment, alarm equipment and water supply. Alarm and detection equipment shall interface to requirements of Electronic Systems.

Hydraulic calculations based on water flow test shall be prepared for each sprinkler system to ensure that flow and pressure requirements can be met with current water supply. See Water Supply and Sanitary Sewage.

Prepare a plan for each floor of each building that presents a compendium of the total fire protection features being incorporated into the design. Provide the following types of information:

- a. The location and rating of any fire-resistive construction such as occupancy separations, area separations, exterior walls, shaft enclosures, corridors, stair enclosures, exit passageways, etc.
- b. The location and coverage of any fire detection systems.

- c. The location and coverage of any fire suppression systems (sprinkler risers, standpipes, etc.).
- d. The location of any other major fire protection equipment.
- e. Indicate any hazardous areas and their classification.
- f. Prepare a schedule describing the system with the following information: fire hazard and occupancy classifications, building construction type, GPM/ square foot sprinkler density, area of operation and other as required.

1.12.2.8 Heating, Ventilating, and Air Conditioning (HVAC)

Design analysis including 50% design calculations and psychometric.

Preliminary temperature control drawings and sequence of operation.

Preliminary equipment sizing, drawings, selections and schedules for major items, including equipment, ductwork, and piping plans and details.

HVAC system drawings for 50% design.

Preliminary EMCS design drawings and interface drawings showing future connections to the existing post-wide EMCS system.

1.12.2.9 Interior Electrical System

A. Exterior, Electrical Site Drawings: Indicate all new and existing above ground and underground electrical, and telecommunication systems. This shall include cables, ducts, manholes, poles, exterior lighting fixtures and utility points of connection. Also, show primary and secondary electrical lines and all communication lines, transformer types and ratings, exterior lighting for streets, parking areas, and walks, and circuits to exterior mechanical equipment.

B. Interior: Provide the following interior electrical drawings.

- 1. Lighting Plan: Indicate the location and type of luminaires including exit signs and emergency lighting units.
- 2. Power Plan: Indicate the location and type of receptacles, panelboards, and other power related equipment.
- 3. Signal Plan: Indicate the location and type of telephone equipment, cable television equipment, public address system components, intrusion detection system and closed circuit television system components.
- 4. Grounding Plan: Provide a preliminary grounding plan.
- 5. Schedules: Provide lighting fixture schedules.

C. Design Analysis: Provide descriptions of all systems intended to be

utilized as well as preliminary calculations for power, lighting, signal and other systems.

D. Specifications: Provide outline specifications for all systems.

1.12.3 95% DESIGN SUBMITTALS

The 95% Design Submittals shall contain, as a minimum, the following items for all submittals:

- a. A complete set of construction documents plans and specifications at the same level of detail as if the project were to be bid including a complete list of equipment, fixtures and materials to be used. The final drawings are an extension of the reviewed 50% drawings and are to include the 50% comments. The additional 5% is to complete the drawings due to the final design review comments. All details shall be shown on the drawings.
- b. The design analysis is an extension of the reviewed 50% design analysis and supports and verifies that the design complies with the requirements of the project.
- c. Submit marked-up specifications. The specifications shall be coordinated with the drawings and describe in detail all items shown on the drawings.

1.12.3.1 Site Development

In addition to the items listed in the 50% submittal requirements, the following items should be addressed:

a. Design Analysis: Indicate all references and guidance used to develop the project such as data from Using Agency and Corps of Engineers technical manuals. The final design analysis should address all site aspects and in particular the following:

1. Storm Drainage: Describe storm drainage system and give basis for design referencing all criteria used. Include layout sketch of storm drainage areas with inlets and storm drainage piping shown. Calculate capacities of the various inlets selected for the project. Prepare storm drainage calculations indicating flow and velocity computations and include in the design analysis. Prepare and include roof drain computations. Draw a sketch of the roof areas showing drainage areas with locations and sizes of gutters, downspouts, and the roof drainage collector system. Include design calculations for the storm water management.
2. Water Service and Fire Protection: TM 5-812-1, TM 5-813-5 and TM 5-813-6. Describe proposed work, cite references, show all calculations including sketch of water system in vicinity of project. Be sure to note existing water storage facilities and capacities on Post and results of hydrant flow test.
3. Sanitary Sewers and Force Mains: TM 5-814-1. Describe proposed

work, cite references, sketch of sanitary system, show all calculations including size of pumps, pump curves and strength of pipe selected.

b. Drawings: The final drawings are a continuation of the ones prepared for the concept submission.

1. Survey Plan.
2. Demolition: Indicate all items to be removed, abandoned, capped, plugged and relocated utilities.
3. Grading Plan: This plan must show new and existing contours and spot elevations in such detail that there will be no question regarding grading to provide positive drainage and indicated stormwater management facilities. Show inlets with top of frame elevations indicated, manholes, valves, hydrants, headwalls and all existing underground utilities. Do not show any new utility lines. Also, show any other features of work which will appear on the new ground surface.
4. Utilities Plan: Each existing and new utility must be clearly shown including building service connections and connections to existing lines. In addition, the locations of all new and existing fire hydrants, valves, manholes, inlets, etc., are required. Show the sizes of existing and new lines with new inlet and manhole numbers but elevations are not shown. A complete legend is required. All new piping, inlets, manholes, hydrants, etc., must be located by dimension from buildings, streets, etc. All roof drain piping to storm drains must also be shown. All storm drain piping for stormwater management must be included. In addition, subdrain piping for paved areas must be shown if required.
5. Layout Plan: This is a complete layout showing existing and new buildings, roads, streets, walks, parking and service areas, etc. Do not show any new or existing contours or spot elevations. Clearly identify the baseline information from which all new facilities are to be located. Layout must be complete with all dimensions in feet and decimals of a foot. Stationing and curve data are required for road or street layout where applicable. Include a complete legend. The layout information may be combined with the utilities plan in those instances where the end result will not be too cluttered.
6. Profiles:
 - a. Profiles for storm drains, sanitary sewers, and force mains are always required in those instances where each utility crosses numerous new or existing utilities and the possibility for conflicts are likely to occur. Profiles for water lines may be required if there are many utility crossings along its alignment. Utility profiles must show:
 1. Existing and finished grade.

2. Manholes, inlets, headwalls, etc., with numeric designations (corresponding to those shown on utility plan).

3. Top and invert elevations.

4. Size, length, and slopes of all lines.

5. All existing and new utility crossings.

6. Type of structures (i.e., Type "E" inlet, Std. MH, etc.) required at each junction.

b. Profiles for roads, streets, etc., must show:

1. Existing and finished grade with all vertical alignment geometric data shown.

2. All new and existing utility crossings.

c. All profiles should be drawn on compatible scales. 1" = 30', 40', or 50' horizontal corresponding to 1" = 3', 4' or 5' vertical. The vertical scale may vary where profiles traverse very steep topography.

7. Details: Standard details for storm drainage, water, sanitary sewer, and miscellaneous site features shall comply with the Department of Public Work's criteria such as Installation Design Guides or, if none are available, use the respective State highway and drainage standard details. The designer has the option to develop any or all details for the project. Special details for specific situations will have to be prepared by the designer.

c. Specifications: Final technical specifications are prepared by editing Uniform Facilities Guide Specifications (UFGS) to reflect the specific features of the particular project being designed. For features not covered by the UFGS, the AE shall prepare job-written specifications specific to the required features.

1.12.3.2 EROSION AND SEDIMENTATION CONTROL, STORM WATER MANAGEMENT, AND NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT::

a. The Architect-Engineer is responsible for preparing both erosion and sedimentation control plans and stormwater management plans during design. Each shall be in accordance with the criteria of the Maryland Department of the Environment(MDE). The Architect-Engineer shall, in the early stages of design, contact the MDE as to their particular requirements for each item. The plan shall also be submitted to the Fort Detrick DIS. The Baltimore District's policy is to incorporate erosion and sedimentation control in all projects and stormwater management where required. If stormwater management is not required, detailed documentation is required in the design analysis.

b. The Architect-Engineer shall submit the erosion and sedimentation control and stormwater management documentation to the Maryland Department

of the Environment Water Management Administration for review.

c. It is the responsibility of the Architect-Engineer to make all submissions for review in a timely manner. Each should be scheduled to allow the reviewing authority to make comments and request resubmission.

d. The Architect-Engineer shall place all erosion and sedimentation control notes, directions, details, etc., on the design drawings. All of these items shall be coordinated with the Fort Detrick DIS and the NAB construction representative.

e. All submissions of erosion and sediment control and stormwater management plans for review and approval must be accompanied by a completed NPDES permit. Consult the MDE which is responsible for jurisdiction at the project location for guidance pertaining to the NPDES permit.

1.12.3.3 Water Supply and Sanitary Sewage

The designer is required to contact the Maryland Department of Environmental Warer Management Administration to verify the correct procedure to follow to obtain construction permits. The designer shall prepare all permit applications required to a "READY FOR SIGNATURE" condition and forward them to the Contracting Officer for appropriate signatures and submittal to the state. All contacts with state agencies shall be documented in writing and furnished to the Corps of Engineers at the 95% submittal.

1.12.3.4 Landscape, Planting and Turfing

Final design drawing(s) shall include a complete schedule of plant materials which indicates their botanical and common names, plan symbols, quantities, sizes, condition furnished, and pertinent remarks. Scale of drawing shall be prepared at 1" = 30'. Drawing shall correspond with the site layout and grading plans and reference coordinates, north arrows, graphic scales and appropriate legends. An overall planting layout shall be developed and shall include enlarged detail plans of specific areas as needed, to clarify requirements. Final design drawings, indicating proposed plants by a (+) mark for the plant location and a circle which is scaled at approximately 2/3 the ultimate growth spread (diameter) of plants, shall also include a complete schedule of plant materials which indicates botanical and common names, plan symbols, quantities, sizes, condition furnished, and pertinent remarks. Final drawings shall also include the basic details for installation of tree, shrub, and ground cover planting, as well as any other applicable details for clarification of specific project requirements.

1.12.3.5 Geotechnical

A final geotechnical report and design analysis.

1.12.3.6 Architectural

All architectural drawings shall be coordinated with the other engineering disciplines. Ensure that the plans are in compliance with the applicable

codes. It shall be the Contractor's responsibility to implement the comments generated from any design review submittal as well as verify the consistency between plans and specifications. The evaluation of the Contractor's submittals shall be based on degree to which the submittal meet the requirements set forth in this document and the specifications.

Completed working drawings shall include plans, elevations, schedules, sections, and all other drawings needed to identify the materials and assembly for this project.

Prewired work station composite floor plans. Prewired work station typical elevations and component inventory. Prewired work station panel identification plan with electrical outlet placement including base feed.

Fire protection plans and analysis.

1.12.3.7 Structural Design

Furnish complete checked calculations for all structural members. Incorporate any changes required by comments on 50% Design Submittal.

Prior to this submittal, structural drawings shall be coordinated with all other design disciplines.

The final structural drawings shall contain the following information as a set of general notes:

- a. The allowable soil bearing value.
- b. The design stresses of structural materials used.
- c. The design live loads used in the design of various portions of the structures.
- d. The design wind speed.
- e. The seismic site classification " S_s ", " S_1 ", and "R" values used in design.

1.12.3.8 Final Plumbing Design Analysis

Final plumbing system drawings.

1.12.3.9 Fire Suppression System

Final fire suppression system design analysis including a file of the input data used in the computer program to design the fire suppression system.

1.12.3.10 Heating, Ventilating and Air Conditioning (HVAC)

Final design analysis of HVAC systems including final load calculations and psychometric analysis..

Final temperature control design drawings.

Final HVAC system drawings including sections of the mechanical room and congested areas where equipment, ductwork, piping is to be located.

Final equipment sizing/selections for major items.

Final EMCS design drawings and interface drawings showing future connections to the existing post-wide EMCS system.

1.12.3.11 Electrical

a. Exterior:

1. Electrical Site Plan: Indicate all new and existing above ground and underground electrical, and telecommunication systems. This shall include cables, ducts, manholes, poles, exterior lighting fixtures and utility points of connection. Also, show primary and secondary electrical lines and all communication lines, transformer types and ratings, exterior lighting for streets, parking areas, and walks, and circuits to exterior mechanical equipment.

2. Electrical Details: Provide details to clarify the above plan and to indicate the installation requirements.

b. Interior:

1. Lighting Plan: Indicate the location and type of luminaries including exit signs and emergency lighting units, switching and control devices, and wiring. Indicate circuit numbers adjacent to homeruns. Indicate the size of all grounding conductors.

2. Power Plan: Indicate the location and type of receptacles, panelboards, and other electrical equipment. Indicate circuit numbers adjacent to homeruns. Indicate the size of all grounding conductors.

3. Signal plan: Indicate the location and type of all outlets, backboards, public address components, intrusion detection components, and closed circuit television components.

4. Grounding plan: Provide a plan of the grounding system showing all points of connections, conductor sizes, burial depth and other information necessary to clearly delineate the system.

5. One Line Diagram: Provide a one-line diagram for the power distribution system.

6. Riser Diagrams: Provide riser diagrams for the telephone, cable television, public address, intrusion detection and closed circuit television systems. All conduits and enclosures shall be sized and indicated on these diagrams.

7. Schedules: Provide panelboard and lighting fixture schedules.

Panelboard schedules shall include the designation, location, mounting (flush or surface), number of phases and wires, voltage, ampacity and total connected load. Indicate the trip rating, frame size, interrupting rating and number of poles for each circuit breaker in the panelboards. List the circuit number, circuit description and load for each branch circuit.

8. Electrical Details: Provide details to clarify the above plans and to indicate the installation requirements.

c. Design Analysis:

1. Narrative: Provide a complete narrative of all systems to be utilized and describe any features that may not be readily apparent on the drawings and specifications.

2. Calculations: Calculations shall include short circuit analysis to indicate available short circuit at the transformer, panelboards, and circuit breakers; interior lighting; exterior lighting via point-to-point analysis; load analysis for justifying conductor and circuit breaker sizes; voltage drop analysis for all feeders and sub-feeders; and grounding calculations.

Specifications: All specifications shall be fully edited for all systems that will be utilized in the project.

1.13 STRUCTURAL INTERIOR DESIGN

1.13.1 Definition

The Structural Interior Design (SID) shall involve the selection and sampling of all applied finishes including material, color, texture and patterns necessary to complete the building's interior architectural features. The SID shall also include all prewired work station finishes and required drawings for prewired work stations. This information shall be submitted in 3" D-ring binders, 8-1/2" x 11" format.

Present architectural finish samples in an orderly arrangements according to like rooms/areas receiving like finishes. Each like room receiving like finishes will be noted as a Color Scheme. Each Color Scheme shall have a written description of material used. This written description shall use the same material abbreviations and notes that appear on the Room Finish Schedule and Legend in the contract drawings. Present prewired work station finishes on a color board separate from the architectural finishes.

Submit the SID binders concurrently with the architectural design submittals.

1.13.2 Preliminary Submittals

The Contractor shall submit three complete sets of the initial SID package at the 50% submittal stage. The design philosophy shall use a warm neutral background color with appropriate accent colors. All SID proposals shall be reviewed and approved by the Government. The Interior Designer shall revise the SID binders after each review and update the SID to satisfy

review comments. Each submittal will follow this method of review until the Government approves the completed SID package.

1.13.3 Final Submittal

After approval of the Preliminary Submittal, the Contractor shall submit three (3) complete sets of the approved and final Structural Interior Design package. Once the Contractor has submitted the SID and the Government has approved the submittal, all materials, finishes, colors, textures and pattern submitted and approved for this project are then considered as part of the contract and the Contractor shall furnish all approved SID finishes. No deviations will be considered.

1.13.4 Format

Submit all SID information and samples on 8 1/2"x 11" modules with only one foldout. The maximum foldout width shall be approximately 25 inches. No foldouts are permitted on the top or bottom of the pages. Place the project title, base, architectural firm, page number and date on the bottom of each page or module.

The module shall support and anchor all samples. Anchor large or heavy samples with mechanical fasteners, velcro or double sided foam tape. Rubber cement or glue will not be acceptable.

Assemble the 8 1/2" x 11" pages and modules in a 3" D-ring binder. Holes for placement of the modules in the binder shall be 3/8" in diameter. Each binder shall be identified on the outside spine and front cover by title, project number, percentage phase and date.

Material and finish samples shall indicate true pattern, color and texture.

Carpet samples shall be large enough to indicate a complete pattern or design.

Where paint manufacturers color names and numbers are used, indicate the finish of the paint such as gloss, semi-gloss, flat and so on.

Signage may include emblems, striping, letters, numbers and logos. The interior designer shall consider visual appearance, organization, location, structural supports (if required) and relation to other base graphics. Indicate on a separate signage sheet the location and message for all signage. Submit a sample of the signage material finish and color with the structural finishes.

No photographs or colored photocopies of materials will be accepted or approved.

The SID Binder shall include the following information at each design submittal in this order:

SEQUENCE OF SID SUBMITTAL

- a. Title page

SEQUENCE OF SID SUBMITTAL

- b. Table of contents
- c. Design objectives - A statement of design objectives explaining the interior design philosophy of the facility shall be provided in the SID. Design objectives and the proposed method of accomplishing the objectives. Shall cover, when applicable, energy efficiency, safety, health, maintenance, image, personal performance of occupants and functional flexibility.
- d. Interior floor plan
- e. Interior sample finish boards
 - Scheme A
 - Scheme B
 - Scheme C

Example: All restrooms could be noted as color scheme "A", all general open office finishes could be noted as color scheme "B" and the main lobby could be noted as color scheme "C".
- f. Room finish schedule
- g. Signage
- h. Signage plan

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 01050

JOB CONDITIONS

01/01

PART 1 GENERAL

1.1 LAYOUT OF WORK

LAYOUT OF WORK: (APR 1972) The Contractor shall lay out his work and shall be responsible for all measurements in connection therewith. The Contractor shall furnish, at his own expense, all templates, platforms, equipment, tools and materials and labor as may be required in laying out any part of the work. The Contractor will be held responsible for the execution of the work to such lines and elevations shown on the drawings or indicated by the Contracting Officer. (CENAB)

1.2 PHYSICAL DATA: (APR 1984)

Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation or conclusion drawn from the data or information by the Contractor. (CENAB)

1.2.1 Transportation Facilities

Fort Detrick's main post is north and contiguous to the city of Frederick, with access via city streets and county roads. The Frederick by-pass, U.S. Route 15, connects with Interstate 70-S and 270, U.S. Routes 40, 15, 340 and Md. Route 26 and provides easy access to West Seventh Street approximately one-half mile south of the main gate of Fort Detrick, to Opposumtown Pike which serves as access to the East Coast Telecommunications Center area and to Rosemont Avenue (West 4th Street) which serves the two west gates of the installation. Montevue Lane and Rocky Springs Road connect the main post with Area "B". There is no direct rail access.

1.2.2 Previous Explorations

Subsurface exploration logs are presented in the contract documents, location of these and the field laboratory data are available for inspection in the Baltimore District, Corps of Engineers, Geotechnical Engineering Branch, Room 9250, City Crescent Building, 10 South Howard Street, Baltimore, Maryland. Prospective bidders are required to call (410) 962-4045 between the hours of 9:00 a.m. and 3:30 p.m., Monday through Friday (excluding Federal Holidays), a minimum of 24 hours in advance to arrange a time and date.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When

used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Shut Down Utility Services; G AR.

Prior approval for service/utility interruptions.

Advance Notice

When changes and/or relocations are required.

Checklist; G AR

A Risk Assessment for excavation and other work in the vicinity of utilities.

Control Records

The recording for which all materials and equipment specified to be salvaged and turned over to the Government.

SD-07 Certificates

Operations Statement

Written proof that the boilers have been properly installed and are operating satisfactorily in accordance with the manufacturer's instructions.

1.4 UTILITIES

1.4.1 Availability of Utilities Including Lavatory Facilities: (JUN 1980)

It shall be the responsibility of the Contractor to provide all utilities he may require during the entire life of the contract. He shall make his own investigation and determinations as to the availability and adequacy of utilities for his use for construction purposes and domestic consumption. He shall install and maintain all necessary supply lines, connections, piping, and meters if required, but only at such locations and in such manner as approved by the Contracting Officer. Before final acceptance of work under this contract, all temporary supply lines, connections and piping installed by the Contractor shall be removed by him in a manner satisfactory to the Contracting Officer. (CENAB)

1.4.2 Interruption of Utilities: (1972)

a. No utility services shall be interrupted by the Contractor to make connections, to relocate, or for any purpose without approval of the Contracting Officer.

b. Request for permission to shut down utility services shall be submitted in writing to the Contracting Officer not less than 17 days prior

to proposed date of interruption. The request shall give the following information:

- c. Nature of Utility (Gas, L.P. or H.P., Water, Etc.)
- d. Size of line and location of shutoff.
- e. Buildings and services affected.
- f. Hours and date of shutoff.
- g. Estimated length of time service will be interrupted.
- h. Services will not be shut off until receipt of approval of the proposed hours and date from the Contracting Officer.
- i. Shutoffs which will cause interruption of Government work operations as determined by the Contracting Officer shall be accomplished during regular non-work hours or on non-work days of the Using Agency without any additional cost to the Government.
- j. Operation of valves on water mains will be by Government personnel. Where shutoff of water lines interrupts service to fire hydrants or fire sprinkler systems, the Contractor shall arrange his operations and have sufficient material and personnel available to complete the work without undue delay or to restore service without delay in event of emergency.
- k. Flow in gas mains which have been shut off shall not be restored until the Government inspector has determined that all items serviced by the gas line have been shut off. (CENAB)

1.4.3 Alterations to Utilities: (AUG 1968)

Where changes and relocations of utility lines are noted to be performed by others, the Contractor shall give the Contracting Officer in writing advance notice at least thirty days of the time that the change or relocation is required. In the event that, after the expiration of thirty days after the receipt of such notice by the Contracting Officer, such utility lines have not been changed or relocated and delay is occasioned to the completion of the work under this contract, the Contractor will be entitled to a time extension equal to the period of time lost by the Contractor after the expiration of said thirty day period. Any modification to existing or relocated lines required as a result of the Contractor's method of operation shall be made wholly at the Contractor's expense and no additional time will be allowed for delays incurred by such modifications. (CENAB)

1.4.4 Utility Markings

The Contractor shall contact the installation/DPW and the One-Call Service, a minimum of 14 days and 48 hours, respectively, prior to any excavation, the Post DPW and Miss Utility requesting utility location markings. The Contractor shall not proceed with any excavation until all utilities,

including abandoned utilities, have been marked to the satisfaction of the Contracting Officer. Prior to requesting the marking of utilities, the Contractor shall stake out proposed excavations and limits of work with white lines ("White Lining"). It is the Contractor's responsibility to ensure that all permits (excavation or otherwise, including DPW permits) are current and up-to-date without expiration. In addition to the above requirements the Contractor shall:

- a) Visually survey and verify that all utility markings are consistent with existing appurtenances such as manholes, valve boxes, poles, pedestals, pad-mounted devices, gas meters, etc. prior to any excavation.
- b) Hand dig test holes to verify the depth and location of all utilities prior to any mechanical excavation within the limits of work. Other non-damaging methods for utility verification, as indicated in (d) below, may be considered subject to approval by the Contracting Officer. Also, verify that any abandoned utilities are not active.
- c) Preserve all utility markings for the duration of the project to the furthest extent possible.
- d) When excavation is performed within 2 feet of any utility line, a non-damaging method of excavation shall be used. The non-damaging method shall be hand digging. Other non-damaging methods, such as, soft digging, vacuum excavation, pneumatic hand tools, may be considered subject to approval by the Contracting Officer.
- e) Regardless of the type of excavation, the Contractor shall notify the Contracting Officer a minimum of 72 hours prior to any excavation activity. Failure to notify the Contracting Officer can result in the issuance of a "Stop Work" order, which shall not be justification for contract delay or time extension. The Government reserves the right to have personnel present on site during any type of excavation.
- f) The Contractor's Quality Control System Manager shall ensure that all excavation requirements herein are met at the time of the preparatory phase of quality control, and that the excavation procedures are reviewed during the preparatory phase meeting. This preparatory phase of control shall also establish and document contingency plans and actions to be followed in the event that existing utilities are damaged or interrupted. Locations of shut off or isolation devices along with other safety features shall be established and their operation reviewed.
- g) Any work other than excavation in the vicinity of a utility, that could damage or interrupt a utility, such as, exterior or interior work near transformers, power lines, poles, above ground gas lines, gas meters, etc., shall be done with extreme care. The Contractor shall specifically note during the preparatory phase of quality control, the construction techniques to be used to preclude damaging or interrupting any utility. This preparatory

phase of control shall also establish and document contingency plans and actions to be followed in the event that existing utilities are damaged or interrupted. Locations of shut off or isolation devices along with other safety features shall be established and their operation reviewed.

- h) The Contractor shall complete a risk assessment, using the attached checklist, at least one week prior to the start of any excavation or other work in the vicinity of a utility. The risk assessment shall be submitted for government approval prior to any excavation or other work in the vicinity of a utility. A risk assessment shall be completed for each definable feature of work encountering utilities and shall include all utilities anticipated to be encountered.

1.5 DISPOSAL OF EXISTING MATERIAL AND EQUIPMENT: (DEC 1975)

All removed, dismantled or demolished material and/or equipment including rubble, scrap and debris not specified or indicated to be Government salvaged, reinstalled under this contract or otherwise retained for disposal on Government land will become the property of the Contractor and shall be promptly removed from the site and disposed of by the Contractor at his own expense and responsibility. (CENAB)

1.6 COMPLIANCE WITH POST/BASE REGULATIONS: (JUL 1980)

The site of the work is at Fort Detrick and all rules and regulations issued by the Commanding Officer covering general safety, security, sanitary requirements, pollution control, traffic regulations and parking, shall be observed by the Contractor. Information regarding these requirements may be obtained by contacting the Contracting Officer, who will provide such information or assist in obtaining same from appropriate authorities. (MEMO)

1.7 MAINTENANCE OF ACCESS: (DEC 1975)

The Contractor shall not block passage through sidewalks, roads, alleys or other entranceways to the job site performance of work under this contract.

In addition, the Contractor shall at all times maintain safe and clear passage through interior corridors and doorways to allow minimal disruption of normal activities within the building. No equipment or new materials are to be stored in the building except those items that are necessary for progress of the immediate work. All existing equipment, materials and debris removed during the work that are not to be reinstalled shall be removed daily by the Contractor from the building. (CENAB)

1.8 PROTECTION OF GOVERNMENT PROPERTY AND PERSONNEL: (DEC 1975)

1.8.1 Protection of Equipment

All existing Government owned equipment within the work area shall be protected by the Contractor from damage caused by construction operations. As a minimum, the Contractor shall cover all furniture, equipment and carpets in the work area with dust barriers and protect such items from any

damage due to dust, vibration, water, heat or other conditions resulting from construction activities. Existing work damaged by construction operations shall be promptly repaired by the Contractor at his own expense.

1.8.2 Protection of Personnel

The Contractor shall protect occupants of the building by installing safety rails and/or barricades as applicable to prevent injury from unauthorized entry of personnel into work areas. Warning signs shall be erected as necessary to indicate Construction areas or hazardous zones. Work shall proceed in such manner as to prevent the undue spread of dust and flying particles.

1.8.3 Measures to Prevent Damage/Injury

The Contractor shall take such additional measures as may be directed by the Contracting Officer to prevent damage or injury to Government property or personnel. (CENAB)

1.9 STREET CLOSINGS: (MAY 1978)

When operations in connection with contract work necessitate the closing of streets, it shall be the Contractor's responsibility to arrange in advance with the Contracting Officer for such street closings and to provide appropriate barricades, signs, markers, flares, and other devices as may be required by the Contracting Officer's Representative for traffic guides and public safety. (CENAB)

1.10 ORDER OF WORK AND COORDINATION WITH OTHER CONTRACTORS: (FEB 1979)

Other Contractors are/maybe presently working in the general area. After award of this contract a meeting will be held with all contractor representatives and the Contracting Officer to develop a plan of work coordination. In case of disagreement regarding use of an area the decision of the Contracting Officer will control. (CENAB)

1.11 MAINTENANCE OF UTILITIES: (FEB 1985)

Throughout construction, the Contractor shall provide and/or maintain toilet facilities for Government personnel. The Contractor shall provide alternate space heating for Government personnel when necessary during shutdown of the heating system. (CENAB)

1.12 ASBESTOS HANDLING AND REMOVAL (FEB 85)

Through site investigations, friable asbestos has not been found, however if asbestos is encountered, its testing, removal and disposal is covered in "CHANGES" clause of the Contract Clauses. (CENAB)

1.13 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

1.13.1 Procedure for Determination

This provision specifies the procedure for determination of time extensions for unusually severe weather in accordance the contract clause entitled "Default: (Fixed Price Construction)". In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

- a. The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.
- b. The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the contractor.

1.13.2 Anticipated Adverse Weather Delays

The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY WORK DAYS BASED ON (5) DAY WORK WEEK

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
7	7	7	5	4	3	3	3	3	4	4	4

1.13.3 Impact

Upon acknowledgment of the Notice to Proceed (NTP) and continuing throughout the contract, the contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the contractor's scheduled work day. The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph "Anticipated Adverse Weather Delays", above, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the contract clause entitled "Default (Fixed Price Construction)".

1.14 WORKING HOURS

WORKING HOURS: (DEC 93) It shall be the Contractors responsibility to obtain the working hours other than the normal five (5) day work week 08:00 am to 4:30 pm.

PART 2 PRODUCTS

NOT APPLICABLE

PART 3 EXECUTION

NOT APPLICABLE

ATTACHMENT

RISK ASSESSMENT CHECKLIST

-- End of Section --

**RISK ASSESSMENT FOR
EXCAVATION AND OTHER WORK IN THE VICINITY OF UTILITIES**

PROJECT NAME: _____
CONTRACT NUMBER: _____
PROJECT INSTALLATION AND LOCATION: _____
PROPOSED EXCAVATION START DATE: _____

1. ☐ **ESTABLISH** EXCAVATION DETAILS AND DRAWINGS (check when completed)
2. ☐ PROPOSED EXCAVATION AREA MARKED ("white lining") (check when completed)
3. ☐ CONTACT APPROPRIATE ONE-CALL SERVICE **FOR PUBLIC UTILITIES:**
MD: Miss Utility 1-800-257-7777 N Y : New York City - Long Island One Call Center 1-800-272-4480
N. VA: Miss Utility 1-800-552-7777 PA: Pennsylvania One-Call System Incorporated 1-800-242-1776
VA: Miss Utility of VA 1-800-552-7001 DC: Miss Utility 1-800-257-7777
ONE-CALL NATIONAL REFERRAL CENTER: 1-888-258-0808

☐ **CONTACT INSTALLATION/OWNERS OF ALL PRIVATELY OWNED UTILITIES (NON ONE-CALL MEMBERS)**

4. ☐ DATE UTILITIES MARKED AND METHOD OF MARKING
ONE-CALL LOCATORS _____
OTHER LOCATORS _____
5. ☐ CONTACT APPROPRIATE DPW REPRESENTATIVES AND COMPLY WITH INSTALLATION PERMIT REQUIREMENTS: _____
6. ☐ UTILITIES IDENTIFIED ON-SITE:
☐ NONE ☐ ELECTRIC ☐ GAS ☐ WATER ☐ TELEPHONE ☐ CATV ☐ SEWER ☐ OTHER _____
7. ☐ LEVEL OF RISK: (Based upon personnel safety and consequences of utility outages.)
☐ SEVERE: Excavation required within the immediate vicinity (<2-ft) of a MARKED utility.
☐ MODERATE: Excav. required outside the immediate vicinity (> 2-ft) of MARKED utility.
☐ MINIMAL: Excavation required in an area with NO utilities.
8. ☐ EXISTING FACILITIES/UTILITIES IN VICINITY:
☐ NON-CRITICAL ☐ MISSION CRITICAL ☐ HIGH-PROFILE ☐ CEREMONIAL
☐ OTHER _____
☐ **CONSEQUENCES IF EXISTING UTILITIES ARE DAMAGED/DISRUPTED** _____
-
9. ☐ ENGINEERING CONTROLS REQUIRED:
☐ NONE ☐ HAND EXCAVATE TO LOCATE UTILITY ☐ EXCAVATE WITH DUE CARE
☐ OTHER _____
10. ☐ ADMINISTRATIVE CONTROLS REQUIRED:
☐ Notification of Contracting Officer's Representative, NOTIFIED on: _____
☐ Notification of Installation/DPW Representative, NOTIFIED on: _____
11. ☐ EMERGENCY NOTIFICATION AT INSTALLATION: POC & PHONE NUMBER _____

THE INFORMATION NOTED ABOVE IS ACCURATE AND THE WORK IS READY TO PROCEED
SIGNED and DATE _____ **CQC MANAGER**

12. ☐ ON-SITE GOVERNMENT REP. RECOMMENDATION FOR APPROVAL TO EXCAVATE:
☐ YES ☐ NO SIGNATURE AND DATE: _____
Comments: _____
13. ☐ AREA ENGINEER APPROVAL TO EXCAVATE:
☐ APPROVED ☐ DENIED SIGNATURE AND DATE: _____
Comments: _____
14. ☐ **CHIEF**, _____ **DIVISION** APPROVAL TO EXCAVATE:
☐ APPROVED ☐ DENIED SIGNATURE AND DATE: _____
Comments: _____

SECTION 01060

SAFETY
01/01

PART 1 GENERAL

1.1 APPLICABLE PUBLICATION

The publications listed below form a part of this specification and are referred to in the text by the basic designation only. All interim changes (changes made between publications of new editions) to the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, will be posted on the Headquarters Website. The date that it is posted shall become the official effective date of the change and contracts awarded after this date shall require to comply accordingly. The website location where these changes can be found is under the button entitled "Changes to EM", located at: "http://www.hq.usace.army.mil/soh/hqusace_soh.htm".

U.S. ARMY CORPS OF ENGINEERS:

EM 385-1-1	(3 Sep 1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual
------------	--

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Safety Supervisor; G AR.

A safety supervisor shall be responsible for overall supervision of accident prevention activities.

SD-07 Certificates

Language Certification

It is the Contractors responsibility to ensure that all employees understand the basic english language.

SD-09 Reports

Activity Phase Hazard Analysis Plan; G AR.

The addressing of the activity phase hazard analysis plan for each activity performed in a phase of work.

Outline Report

A report for each past activities review.

OSHA Log

A log shall be reported monthly for injuries.

1.3 GENERAL

The U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, and all subsequent revisions referred to in the Contract Clause ACCIDENT PREVENTION of this contract, are hereby supplemented as follows:

a. The Contractor shall designate an employee responsible for overall supervision of accident prevention activities. Such duties shall include: (1) assuring applicable safety requirements are (a) communicated to the workers in a language they understand (reference EM 385-1-1, September 1996, 01.A.04). It is the Contractor's responsibility to ascertain if there are workers on the job who do not speak and/or understand the English language, if such workers are employed by the prime contractor or subcontractors, at any tier, it is the prime contractor's responsibility to insure that all safety programs, signs, and tool box meetings are communicated to the workers in a language they understand, and that a bilingual employee is on site at all time. If the contractor contends that interpreters and/or bilingual signs are not required, language certification must be provided which verifies that all workers (whose native tongue is other than English) have a command of the English language sufficient to understand all direction, training and safety requirements, whether written or oral, and (b) incorporated in work methods, and (2) inspecting the work to ensure that safety measures and instructions are actually applied. The proposed safety supervisor name and qualifications shall be submitted in writing for approval to the Contracting Officer's Representative. This individual must have prior experience as a safety engineer or be able to demonstrate his/her familiarity and understanding of the safety requirements over a prescribed trial period. The safety engineer shall have the authority to act on behalf of the Contractor's general management to take whatever action is necessary to assure compliance with safety requirements. The safety supervisor is required to be on the site when work is being performed.

b. Prior to commencement of any work at a job site, a preconstruction safety meeting shall be held between the Contractor and the Corps of Engineers Area/Resident Engineer to discuss the Contractor's safety program and in particular to review the following submittals:

(1) Contracts Accident Prevention Plan: An acceptable accident prevention plan, written by the prime Contractor for the specific work and implementing in detail the pertinent requirements of EM 385-1-1, shall be submitted for Government approval.

(2) Activity Phase Hazard Analysis Plan: Prior to beginning each major phase of work, an activity hazard analysis (phase plan) shall be prepared by the Contractor for that phase of work and submitted to the Contracting Officer's Representative for approval. A phase is defined as an operation involving a type of work presenting hazards not experienced in previous operations or where a new subcontractor or work crew is to perform work. The analysis shall address the hazards for each activity performed in the phase and shall present the procedures and safeguards necessary to eliminate the hazards or reduce the risk to an acceptable level.

c. Subsequent jobsite safety meetings shall be held as follows:

(1) A safety meeting shall be held at least once a month for all supervisors on the project to review past activities, to plan ahead for new or changed operations and to establish safe working procedures to anticipated hazards. An outline report of each monthly meeting shall be submitted to the Contracting Officer's Representative.

(2) At least one safety meeting shall be conducted weekly, or whenever new crews begin work, by the appropriate field supervisors or foremen for all workers. An outline report of the meeting giving date, time, attendance, subjects discussed and who conducted it shall be maintained and copies furnished the designated authority on request.

1.4 ACCIDENTS

Chargeable accidents are to be investigated by both Contractor personnel and the Contracting Officer.

1.4.1 Accident Reporting, ENG FORM 3394

Section 1, Paragraph 01.D, OF EM 385-1-1 and the Contract Clause entitled ACCIDENT PREVENTION are amended as follows: The prime Contractor shall report on Eng Form 3394, supplied by the Contracting Officer, all injuries to his employees or subcontractors that result in lost time and all damage to property and/or equipment in excess of \$2,000 per incident. Verbal notification of such accident shall be made to the Contracting Officer within 24 hours. A written report on the above noted form shall be submitted to the Contracting Officer within 72 hours following such accidents. The written report shall include the following:

a. A description of the circumstances leading up to the accident, the cause of the accident, and corrective measures taken to prevent recurrence.

b. A description of the injury and name and location of the medical facility giving examination and treatment.

c. A statement as to whether or not the employee was permitted to return to work after examination and treatment by the doctor, and if not, an estimate or statement of the number of days lost from work. If there have been days lost from work, state whether or not the employee has been re-examined and declared fit to resume work as of the date of the report.

1.4.2 OSHA Requirements

1.4.2.1 OSHA Log

A copy of the Contractor's OSHA Log of Injuries shall be forwarded monthly to the Contracting Officer.

1.4.2.2 OSHA Inspections

Contractors shall immediately notify the Contracting Officer when an OSHA Compliance official (Federal or State representative) presents his/her credentials and informs the Contractor that the workplace will be inspected for OSHA compliance. Contractors shall also notify the Contracting Officer upon determination that an exit interview will take place upon completion of the OSHA inspection. (NABSA OCT 05, 1976)

1.5 GOVERNMENT APPROVAL

Submittals shall be in accordance with Section 01330 SUBMITTAL PROCEDURES. All required submittals of items specified in this section shall be for information only, except for those items including, but not limited to, the following which shall be submitted for Government approval:

- a. Written designation of safety representative.
- b. Written project specific accident prevention plan.
- c. Written activity phase hazard analysis plan.

PART 2 PRODUCT
NOT APPLICABLE

PART 3 EXECUTION
NOT APPLICABLE

-- End of Section --

SECTION 01200

WARRANTY REQUIREMENT

PART 1 GENERAL

1.1 WARRANTY OF CONSTRUCTION

The Contractor shall warranty all materials and workmanship in accordance with Contract Clause (FAR 52.246-21), "WARRANTY OF CONSTRUCTION"

1.2 MANUFACTURER'S WARRANTY

The Contractor shall provide manufacturer's warranties, when available, on all equipment for one year starting from the day of facility acceptance by the Government. Any warranty offered by the manufacturer for periods greater than one year or required by other sections of the specifications shall also be provided.

1.3 WARRANTY PAYMENT

Warranty work is a subsidiary portion of the contract work, and has a value to the Government of \$5,000. The Contractor will assign a value of that amount in the breakdown for progress payments mentioned in the Contract Clause (FAR 52.232-5) "Payments Under Fixed-Price Construction". If the Contractor fails to respond to warranty items as provided in paragraph CONTRACTOR'S RESPONSE TO WARRANTY SERVICE REQUIREMENTS below, the Government may elect to acquire warranty repairs through other sources and, if so, shall backcharge the Contractor for the cost of such repairs. Such backcharges shall be accomplished under the Contract Clause (FAR 52.243-4) "CHANGES" of the contract through a credit modification(s).

1.4 PERFORMANCE BOND

The Contractor's Performance Bond will remain effective throughout the construction warranty period and warranty extensions.

1.4.1 Failure to Commence

In the event the Contractor or his designated representative(s) fail to commence and diligently pursue any work required under this clause, and in a manner pursuant to the requirements thereof, the Contracting Officer shall have the right to demand that said work be performed under the Performance Bond by making written notice on the surety. If the surety fails or refuses to perform the obligation it assumed under the Performance Bond, the Contracting Officer shall have the work performed by others, and after completion of the work, may demand reimbursement of any or all expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

1.5 PRE-WARRANTY CONFERENCE

Prior to contract completion and at a time designated by the Contracting Officer, the Contractor shall meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this specification. Communication procedures for Contractor notification of warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty shall be reviewed at this meeting. The Contractor shall provide names, addresses, and telephone numbers of all subcontractors, equipment suppliers, or manufacturers with specific designation of their area of responsibilities if they are to be contacted directly on warranty corrections. This point of contact will be located within the local service area of the warranted construction, will be continuously available, and will be responsive to Government inquiry on warranty work action and status. Minutes of the meeting will be prepared by the Government and signed by both, the Contractor and the Contracting Officer. The minutes shall become part of the contract file.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES FOR DESIGN BUILD:

SD-04 Samples

Sample Tags.

To identify the warranty for all Contractor and Government furnished equipment which the Contractor installs.

1.7 ADDITIONAL REQUIREMENTS

1.7.1 Equipment Warranty Identification Tags

The Contractor shall provide warranty identification tags on all Contractor and Government furnished equipment which he has installed.

1.7.1.1 Format and Size for Tags

The tags shall be similar in format and size to the exhibits provided by this specification, they shall be suitable for interior and exterior locations, resistant to solvents, abrasion, and to fading caused by sunlight, precipitation. etc. . These tags shall have a permanent pressure-sensitive adhesive back, and they shall be installed in a position that is easily (or most easily) noticeable. Contractor furnished equipment that has differing warranties on its components will have each component tagged.

1.7.1.2 Sample Tags

Fire Station Expansion and Renovation
Fort Detrick, Maryland

Sample tags shall be filled out representative of how the Contractor will complete all other tags. These tags shall be submitted to the Government.

1.7.1.3 Tags for Warranted Equipment

The tag for this equipment shall be similar to the following. Exact format and size will be as approved.

EQUIPMENT WARRANTY	
CONTRACTOR FURNISHED EQUIPMENT	
MFG: _____	MODEL NO.: _____
SERIAL NO.: _____	CONTRACT NO.: _____
CONTRACTORS NAME: _____	
CONTRACTOR WARRANTY EXPIRES: _____	
MFG WARRANTY(IES) EXPIRE: _____	

EQUIPMENT WARRANTY	
GOVERNMENT FURNISHED EQUIPMENT	
MFG: _____	MODEL NO.: _____
SERIAL NO.: _____	CONTRACT NO.: _____
DATE EQUIPMENT PLACED IN SERVICE: _____	
MFG WARRANTY(IES) EXPIRES: _____	

1.7.1.4 Execution

The Contractor will complete the required information on each tag and install these tags on the equipment by the time of and as a condition of final acceptance of the equipment. All tags shall be mechanically attached to the equipment as directed by the Contracting Officer.

1.7.1.5 Equipment Warranty Tag Replacement

The contractor shall provide new tags on repaired or replaced equipment during the warranty period. The tag shall be identical to the original tag, except that the Contractor's warranty expiration date shall be updated to show the correct warranty expiration date.

1.8 CONTRACTOR'S RESPONSE TO WARRANTY SERVICE REQUIREMENTS

1.8.1 Notification to Warranty Service Requirements

Following oral or written notification by authorized representative of the installation designated in writing by the Contracting Officer, the Contractor shall respond to warranty service requirements in accordance with the "Warranty Service Priority List" and the three categories of priorities listed below.

1.8.1.1 Categories of Priorities

- a. First Priority Code 1: Perform on site inspection to evaluate situation, determine course of action, initiate work within 24 hours and work continuously to completion or relief.
- b. Second Priority Code 2: Perform on site inspection to evaluate situation, determine course of action, initiate work within 48 hours and work continuously to completion or relief.
- c. Third Priority Code 3: All other work to be initiated within 5 work days end work continuously to completion or relief.

1.8.1.2 Warranty Service Priority List

AIR TRAFFIC CONTROL AND AIR NAVIGATION SYSTEMS AND EQUIPMENT

Code 1

AIR CONDITIONING SYSTEM

Code 1:

- a. Hospital.
- b. Buildings with computer equipment.
- c. Commissary and Main PX.
- d. Clubs.
- e. Barracks, mess halls, BOQ/BEQ (entire building down).
- f. Troop medical and dental.

Fire Station Expansion and Renovation
Fort Detrick, Maryland

Code 2:

- a. Recreational support.
- b. Air conditioning leak in part of building, if causing damage.
- c. Admin buildings with ADP equipment not on priority list.

DOORS

Code 1:

- a. Overhead doors not operational

ELECTRICAL

Code 1:

- a. Power failure (entire area or any building operational after 1600 hours).
- b. Traffic control devices.
- c. Security lights.

Code 2:

- a. Power failure (no Power to a room or part of building),
- b. Receptacle and lights.
- c. Fire alarm systems.

GAS

Code 1

- a. Leaks and breaks.
- b. No gas to family housing unit or cantonment area.

HEAT

Code 1

- a. Hospital/Medical facilities
- b. Commissary and Main PX.
- c. Clubs.
- d. Area power failure affecting heat.

Code 2

- a. Medical storage.
- b. Barracks.

INTRUSION DETECTION SYSTEMS

Code 1

- a. Finance, PX and Commissary, and high security areas.

Code 2

- a. Systems other than those listed under Code 1.

KITCHEN EQUIPMENT

Code 1

- a. Dishwasher.
- b. All other equipment hampering preparation of a meal.

Code 2

- a. All other equipment not listed under Code 1.

PLUMBING

Code 2

- a. Flush valves.
- b. Fixture drain, supply line commode, or water pipe leaking.
- c. Commode leaking at base.

REFRIGERATION

Code 1

- a. Commissary.
- b. Mess Hall.
- c. Cold Storage.
- d. Hospital.
- e. Medical storage.

Code 2

- a. Mess hall - other than walk-in refrigerators and freezers.

ROOF LEAKS

Code 1

- a. Temporary repairs will be made where major damage to property is occurring.

Code 2

- a. Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.

SWIMMING POOLS

Code 1

- a. Chlorine leaks or broken pumps.

TANK WASH RACKS (Bird Baths)

Code 1

- a. All systems which prevent tank wash.

WATER (Exterior)

Code 1

- a. Normal operation of water pump station.

Code 2

- No water to facility.

WATER, HOT (and STEAM)

Code 1

- a. Hospitals.
- b. Mess Halls.
- c. BOQ. BEQ. barracks (entire building).
- d. Medical and dental.

Code 2

- a. No hot water in portion of building listed under Code 1 (items a through c).

SPRINKLER SYSTEM

Code 1

- a. All sprinkler systems, valves, manholes, deluge systems, and air systems to sprinkler

1.8.2 Availability of Required Parts

Should parts be required to complete the work and the parts are not immediately available the Contractor shall have a maximum of 12 hours after arrival at the job site to provide authorized representative of the installation with firm written plan for emergency alternatives and temporary repairs for Government participation with the Contractor to provide emergency relief until the required parts are available on site for the Contractor to perform permanent warranty repair. The Contractors plan shall include a firm date and time that the required parts shall be available on site to complete the permanent warranty repair.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 01312A

QUALITY CONTROL SYSTEM (QCS)

08/01

PART 1 GENERAL

1.1 GENERAL

The Government will use the Resident Management System for Windows (RMS) to assist in its monitoring and administration of this contract. The Contractor shall use the Government-furnished Construction Contractor Module of RMS, referred to as QCS, to record, maintain, and submit various information throughout the contract period. This joint Government-Contractor use of RMS and QCS will facilitate electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

- Administration
- Finances
- Quality Control
- Submittal Monitoring
- Scheduling
- Import/Export of Data

1.1.1 Correspondence and Electronic Communications

For ease and speed of communications, both Government and Contractor will, to the maximum extent feasible, exchange correspondence and other documents in electronic format. Correspondence, pay requests and other documents comprising the official contract record shall also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

1.1.2 Other Factors

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01330, SUBMITTAL PROCEDURES, and Section 01459, CONTRACTOR QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through QCS.

Also, there is no separate payment for establishing and maintaining the QCS database; all costs associated therewith shall be included in the contract pricing for the work.

1.2 QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior

to the Pre-Construction Conference, the Contractor shall be responsible to download, install and use the latest version of the QCS software from the Government's RMS Internet Website. Upon specific justification and request by the Contractor, the Government can provide QCS on 3-1/2 inch high-density diskettes or CD-ROM. Any program updates of QCS will be made available to the Contractor via the Government RMS Website as they become available.

1.3 SYSTEM REQUIREMENTS

The following listed hardware and software is the minimum system configuration that the Contractor shall have to run QCS:

Hardware

IBM-compatible PC with 200 MHz Pentium or higher processor

32+ MB RAM

4 GB hard drive disk space for sole use by the QCS system

3 1/2 inch high-density floppy drive

Compact disk (CD) Reader

Color monitor

Laser printer compatible with HP LaserJet III or better, with minimum 4 MB installed memory.

Connection to the Internet, minimum 28 BPS

Software

MS Windows 95 or newer version operating system (MS Windows NT 4.0 or newer is recommended)

Word Processing software compatible with MS Word 97 or newer

Internet browser

The Contractor's computer system shall be protected by virus protection software that is regularly upgraded with all issued manufacturer's updates throughout the life of the contract.

Electronic mail (E-mail) compatible with MS Outlook

1.4 RELATED INFORMATION

1.4.1 QCS User Guide

After contract award, the Contractor shall download instructions for the installation and use of QCS from the Government RMS Internet Website; the

Contractor can obtain the current address from the Government. In case of justifiable difficulties, the Government will provide the Contractor with a CD-ROM containing these instructions.

1.4.2 Contractor Quality Control(QQC) Training

The use of QCS will be discussed with the Contractor's QC System Manager during the mandatory QC Training class.

1.5 CONTRACT DATABASE

Prior to the pre-construction conference, the Government shall provide the Contractor with basic contract award data to use for QCS. The Government will provide data updates to the Contractor as needed, generally by files attached to E-mail. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.6 DATABASE MAINTENANCE

The Contractor shall establish, maintain, and update data for the contract in the QCS database throughout the duration of the contract. The Contractor shall establish and maintain the QCS database at the Contractor's site office. Data updates to the Government shall be submitted by E-mail with file attachments, e.g., daily reports, schedule updates, payment requests. If permitted by the Contracting Officer, a data diskette or CD-ROM may be used instead of E-mail (see Paragraph DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM). The QCS database typically shall include current data on the following items:

1.6.1 Administration

1.6.1.1 Contractor Information

The database shall contain the Contractor's name, address, telephone numbers, management staff, and other required items. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver Contractor administrative data in electronic format via E-mail.

1.6.1.2 Subcontractor Information

The database shall contain the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor must be listed separately for each trade to be performed. Each subcontractor/trade shall be assigned a unique Responsibility Code, provided in QCS. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver subcontractor administrative data in electronic format via E-mail.

1.6.1.3 Correspondence

All Contractor correspondence to the Government shall be identified with a serial number. Correspondence initiated by the Contractor's site office shall be prefixed with "S". Letters initiated by the Contractor's home

(main) office shall be prefixed with "H". Letters shall be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

1.6.1.4 Equipment

The Contractor's QCS database shall contain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.6.1.5 Management Reporting

QCS includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of QCS. Among these reports are: Progress Payment Request worksheet, QA/QC comments, Submittal Register Status, Three-Phase Inspection checklists.

1.6.1.6 EM 385-1-1, Corps of Engineers Safety Manual and QCS Linkage

Upon request, the Contractor can obtain a copy of the current version of the Safety Manual, EM 385-1-1, on CD or visit ["http://www.usace.army.mil/inet/usace-docs/ent-manuals/em385-1-1/entire.pdf"](http://www.usace.army.mil/inet/usace-docs/ent-manuals/em385-1-1/entire.pdf). Data on the CD will be accessible through QCS, or in stand-alone mode.

1.6.2 Finances

1.6.2.1 Pay Activity Data

The QCS database shall include a list of pay activities that the Contractor shall develop in conjunction with the construction schedule. The sum of all pay activities shall be equal to the total contract amount, including modifications. Pay activities shall be grouped by Contract Line Item Number (CLIN), and the sum of the activities shall equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

1.6.2.2 Payment Requests

All progress payment requests shall be prepared using QCS. The Contractor shall complete the payment request worksheet and include it with the payment request. The work completed under the contract, measured as percent or as specific quantities, shall be updated at least monthly. After the update, the Contractor shall generate a payment request report using QCS. The Contractor shall submit the payment requests with supporting data by E-mail with file attachment(s). If permitted by the Contracting Officer, a data diskette may be used instead of E-mail. A signed paper copy of the approved payment request is also required, which shall govern in the event of discrepancy with the electronic version.

1.6.3 Quality Control (QC)

QCS provides a means to track implementation of the 3-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other contractor QC requirements. The

Contractor shall maintain this data on a daily basis. Entered data will automatically output to the QCS generated daily report. The Contractor shall provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01459, CONTRACTOR QUALITY CONTROL. Within seven calendar days of Government acceptance, the Contractor shall submit a data diskette or CD-ROM reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

1.6.3.1 Daily Contractor Quality Control (CQC) Reports.

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS shall be the Contractor's official report. Data from any supplemental reports by the Contractor shall be summarized and consolidated onto the QCS-generated Daily CQC Report. Daily CQC Reports shall be submitted as required by Section 01459, CONTRACTOR QUALITY CONTROL. Reports shall be submitted electronically to the Government using E-mail or diskette within 24 hours after the date covered by the report. Use of either mode of submittal shall be coordinated with the Government representative. The Contractor shall also provide the Government a signed, printed copy of the daily CQC report.

1.6.3.2 Deficiency Tracking.

The Contractor shall use QCS to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using QC punch list items. The Contractor shall maintain a current log of its QC punch list items in the QCS database. The Government will log the deficiencies it has identified using its QA punch list items. The Government's QA punch list items will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of both QC and QA punch list items.

1.6.3.3 Three-Phase Control Meetings

The Contractor shall maintain scheduled and actual dates and times of preparatory and initial control meetings in QCS.

1.6.3.4 Accident/Safety Tracking.

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of the safety comments. In addition, the Contractor shall utilize QCS to advise the Government of any accidents occurring on the jobsite. This brief supplemental entry is not to be considered as a substitute for completion of mandatory reports, e.g., ENG Form 3394 and OSHA Form 200.

1.6.3.5 Features of Work

The Contractor shall include a complete list of the features of work in the QCS database. A feature of work may be associated with multiple pay

activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

1.6.3.6 QC Requirements

The Contractor shall develop and maintain a complete list of QC testing, transferred and installed property, and user training requirements in QCS. The Contractor shall update all data on these QC requirements as work progresses, and shall promptly provide this information to the Government via QCS.

1.6.4 Submittal Management

The Government will provide the initial submittal register, ENG Form 4288, SUBMITTAL REGISTER, in electronic format. Thereafter, the Contractor shall maintain a complete list of all submittals, including completion of all data columns. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update, ENG Form 4288, shall be produced using QCS. RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

1.6.5 Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data, and schedule data using SDEF.

1.7 IMPLEMENTATION

Contractor use of QCS as described in the preceding paragraphs is mandatory. The Contractor shall ensure that sufficient resources are available to maintain its QCS database, and to provide the Government with regular database updates. QCS shall be an integral part of the Contractor's management of quality control.

1.8 DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM

The Government-preferred method for Contractor's submission of updates, payment requests, correspondence and other data is by E-mail with file attachment(s). For locations where this is not feasible, the Contracting Officer may permit use of computer diskettes or CD-ROM for data transfer. Data on the disks or CDs shall be exported using the QCS built-in export function. If used, diskettes and CD-ROMs will be submitted in accordance with the following:

1.8.1 File Medium

The Contractor shall submit required data on 3-1/2 inch double-sided high-density diskettes formatted to hold 1.44 MB of data, capable of running under Microsoft Windows 95 or newer. Alternatively, CD-ROMs may be

used. They shall conform to industry standards used in the United States. All data shall be provided in English.

1.8.2 Disk or CD-ROM Labels

The Contractor shall affix a permanent exterior label to each diskette and CD-ROM submitted. The label shall indicate in English, the QCS file name, full contract number, contract name, project location, data date, name and telephone number of person responsible for the data.

1.8.3 File Names

The Government will provide the file names to be used by the Contractor with the QCS software.

1.9 MONTHLY COORDINATION MEETING

The Contractor shall update the QCS database each workday. At least monthly, the Contractor shall generate and submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, the Contractor shall meet with the Government representative to review the planned progress payment data submission for errors and omissions. The Contractor shall make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be returned. The Government will not process progress payments until an acceptable QCS export file is received.

1.10 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification.

-- End of Section --

SECTION 01320

PROJECT SCHEDULE FOR DESIGN BUILD

PART 1 GENERAL

1.1 REFERENCE

The publications listed below form a part of the specification to the extent referenced. The publications are referenced in the text by basic designation only.

ENGINEERING REGULATIONS (ER)

ER 1-1-11 (1995) Progress, Schedules, and Network
Analysis Systems

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES FOR DESIGN BUILD:

SD-01 Preconstruction Submittals

Initial Project Schedule; G.

Shows sequence of activities for work through the entire project and shall be at a reasonable level of detail.

Preliminary Project Schedule; G.

Payment Purpose.

Periodic Schedule Updates; G.

Three copies of the schedules showing codes, values, categories, numbers, items, etc, as required.

Qualifications.

Documentation showing qualifications of personnel preparing schedule reports.

Narrative Report.

Schedule Reports.

Three copies of the reports showing numbers, descriptions, dates, float,

starts, finishes, durations, sequences, etc., as required.

1.3 QUALIFICATIONS

The Contractor shall designate an authorized representative who shall be responsible for the preparation of all required project schedule reports. This person shall have previously created and reviewed computerized schedules. Qualifications of this individual shall be submitted to the Contracting Officer's Representative for review with the Preliminary Project Schedule submission.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Pursuant to the Contract Clause, SCHEDULE FOR CONSTRUCTION CONTRACTS a Project Schedule as described below shall be prepared. The Contractor shall be responsible for scheduling of all design, procurement and construction activities. Contractor management personnel shall actively participate in its development. Designers, subcontractors and suppliers working on the project should also contribute in developing and maintaining an accurate Project Schedule. The approved Project Schedule shall be used to measure the progress of the work, to aid in evaluating time extensions, and to provide the basis of all progress payments.

3.2 BASIC FOR PAYMENT

The schedule shall be the basis for measuring Contractor progress. Lack of an approved schedule or scheduling personnel shall result in an inability of the Contracting Officer's Representative to evaluate Contractor progress for the purposes of payment. Failure of the Contractor to provide all information, as specified below, shall result in the disapproval of the entire Project Schedule submission and the inability of the Contracting Officer's Representative to evaluate Contractor progress for payment purposes. In the case where Project Schedule revisions have been directed by the Contracting Officer's Representative and those revisions have not been included in the Project Schedule, then the Contracting Officer's Representative may hold retainage up to the maximum allowed by contract, each payment period, until revisions to the Project Schedule have been made.

3.3 PROJECT SCHEDULE

The computer software system utilized by the Contractor to produce the Project Schedule shall be capable of providing all requirements of this specification. Failure of the Contractor to meet the requirements of this specification shall result in the disapproval of the schedule. Manual methods used to produce any required information shall require approval by the Contracting Officer's Representative.

3.3.1 Use of the Critical Path Method

The Critical Path Method (CPM) of network calculation shall be used to generate the Project Schedule. The Contractor shall provide the Project Schedule in either the Precedence Diagram Method (PDM) or the Arrow Diagram Method (ADM).

3.3.2 Level of Detail Required

With the exception of the initial and preliminary schedule submission, the Project Schedule shall include an appropriate level of detail. Failure to develop or update the Project Schedule or provide data to the Contracting Officer's Representative at the appropriate level of detail, as specified by the Contracting Officer's Representative, shall result in the disapproval of the schedule. The Contracting Officer's Representative will use, but is not limited to, the following conditions to determine the appropriate level of detail to be used in the Project Schedule.

3.3.2.1 Activity Durations

Contractor submissions shall be required to follow the direction of the Contracting Officer's Representative regarding reasonable activity durations. Reasonable durations are those that allow the progress of activities to be accurately determined between payment periods. A rule of thumb, that the Contractor should use, is that less than 2 percent of all non-procurement activities' Original Durations shall be greater than 20 days.

3.3.2.2 Design and Permit Activities

The Contractor shall integrate design and permitting activities, including necessary conferences and follow-up actions and design package submission dates into the schedule.

3.3.2.3 Procurement Activities

Tasks related to the procurement of long lead materials or equipment shall be included as separate activities in the project schedule. Long lead materials and equipment are those materials that have a procurement cycle of over 90 days. Examples of procurement process activities include, but are not limited to: submittals, approvals, procurement, fabrication, delivery, installation, start-up, and testing.

3.3.2.4 Government Activities

Government and other agencies activities that could impact progress shall be shown. These activities include, but are not limited to: design reviews, submittal reviews, environmental permit approvals by State regulators, inspections, utility tie-in, Government Furnished Equipment (GFE) and notice to proceed for phasing requirements.

3.3.2.5 Workers Per Day

All activities shall have an estimate of the average number of workers per day that are expected to be used during the execution of the activity. If no workers are required for an activity, in the case of activities related

to procurement, for example, then the activity shall be identified as using zero workers per day. The workers per day information for each activity shall be identified by the Workers Per Day Code.

3.3.2.6 Responsibility

All activities shall be identified in the project schedule by the party responsible to perform the work. Responsibility includes, but is not limited to, the subcontracting firm, contractor work force, or government agency performing a given task. Activities shall not belong to more than one responsible party. The responsible party for each activity shall be identified by the Responsibility Code.

3.3.2.7 Work Areas

All activities shall be identified in the project schedule by the work area in which the activity occurs. Activities shall not be allowed to cover more than one work area. The work area of each activity shall be identified by the Work Area Code.

3.3.2.8 Modification or Claim Number

Any activity that is added or changed by contract modification or used to justify claimed time shall be identified by a mod or claim code that changed the activity. Activities shall not belong to more than one modification or claim item. The modification or claim number of each activity shall be identified by the Mod or Claim Number.

3.3.2.9 Phase of Work

All activities shall be identified in the project schedule by the phases of work in which the activity occurs. Activities shall not be allowed to contain work in more than one phase of work. The project phase of each activity shall be by the unique Phase of Work Code.

3.3.2.10 Category of Work

All Activities shall be identified in the project schedule according to the category of work which best describes the activity. Category of work refers, but is not limited to, the procurement chain of activities including such items as submittals, approvals, procurement, fabrication, delivery, installation, start-up, and testing. The category of work for each activity shall be identified by the Category of Work Code.

3.3.2.11 Feature of Work

All activities shall be identified in the project schedule according to the feature of work to which the activity belongs. Feature of work refers, but is not limited to a work breakdown structure for the project. The feature of work for each activity shall be identified by the Feature of Work Code.

3.3.3 Scheduled Project Completion

The schedule interval shall extend from Notice-to-Proceed to the contract

completion date.

3.3.3.1 Project Start Date

The schedule shall start no earlier than the date that the Notice to Proceed (NTP) was acknowledged. The Contractor shall include as the first activity in the project schedule an activity called "Start Project". The "Start Project" activity shall have: a "ES" constraint, a constraint date equal to the date that the NTP was acknowledged, and a zero day duration.

3.3.3.2 Constraint of Last Activity

Completion of the last activity in the schedule shall be constrained by the contract completion date. Calculation on project updates shall be such that if the early finish of the last activity falls after the contract completion date, then the float calculation shall reflect a negative float on the critical path. The Contractor shall include as the last activity in the project schedule an activity call "End Project". The "End Project" activity shall have: a "LF" constraint, a constraint date equal to the completion date for the project, and a zero day duration.

3.3.3.3 Early Project Completion

In the event the project schedule shows completion, the project prior to the contract completion date, the Contractor shall identify those activities that have been accelerated and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. Contractor shall specifically address each of the activities noted at every project schedule update period to assist the Contracting Officer's Representative to evaluate the Contractor's ability to actually complete prior to the contract period.

3.3.4 Interim Completion Dates

Contractually specified interim completion dates shall also be constrained to show negative float if the early finish date of the last activity in that phase falls after the interim completion date.

3.3.4.1 Start Phase

The Contractor shall include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have: an "ES" constraint date equal to the date on which NTP was acknowledged, and a zero day duration.

3.3.4.2 End Phase

The Contractor shall include as the last activity in a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have: an "LF" constraint date equal to the completion date for the project, and a zero day duration.

3.3.4.3 Phase X

The Contractor shall include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" activity shall be logically tied to the earliest and latest activities in the phase.

3.3.5 Default Progress Data Disallowed

Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in CPM scheduling software systems. Actual Start and Finish dates on the CPM schedule shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the Actual Start and Finish dates on the Daily Quality Control report for every in progress or completed activity and insure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's schedule and the inability of the Contracting Officer's Representative to evaluate Contractor progress for payment purposes.

3.3.6 Out-of-Sequence Progress

Activities that have posted progress without predecessors being completed (Out-of-Sequence Progress) shall be allowed only by the case-by-case approval of the Contracting Officer's Representative. The Contracting Officer's Representative may direct that changes in schedule logic be made to correct any or all out-of-sequence work.

3.3.7 Extended Non-Work Periods

Designation of Holidays to account for non-work periods of over 5 days shall not be allowed. Non-work periods of over 5 days shall be identified by addition of activities that represent the delays. Modifications to the logic of the project schedule shall be made to link those activities that may have been impacted by the delays to the newly added delay activities.

3.3.8 Negative Lags

Lag durations contained in the project schedule shall not have a negative value.

3.4 PROJECT SCHEDULE SUBMISSIONS

The Contractor shall provide the submissions as described below. The data disk, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

3.4.1 Preliminary Project Schedule Submission

The Preliminary Project Schedule, defining the Contractor's planned operations for the first 60 calendar days shall be submitted for approval within 20 calendar days after Notice to Proceed is acknowledged. The approved preliminary schedule shall be used for payment purposes not to exceed 60 calendar days after Notice to Proceed.

3.4.2 Initial Project Schedule Submission

The Initial Project Schedule shall be submitted for approval within 40 calendar days after Notice to Proceed. The schedule shall provide a reasonable sequence of activities which represent work through the entire project and shall be at a reasonable level of detail.

3.4.3 Periodic Schedule Updates

Based on the result of progress meetings, specified in "Periodic Progress Meetings," the Contractor shall submit periodic schedule updates. These submissions shall enable the Contracting Officer's Representative or to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgement of the Contracting Officer's Representative or authorized representative, is necessary for verifying the contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made.

3.4.4 Standard Activity Coding Dictionary

The Contractor shall use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11, Appendix A. This exact structure is mandatory, even if some fields are not used.

3.5 SUBMISSION REQUIREMENTS

The following items shall be submitted by the Contractor for the initial submission, and every periodic project schedule update throughout the life of the project:

3.5.1 Data Disks

Three data disks containing the project schedule shall be provided. Data on the disks shall adhere to the SDEF format specified in ER 1-1-11, Appendix A.

3.5.1.1 File Medium

Required data shall be submitted on 3.5 disks, formatted to hold 1.44 MB of data, under the MS-DOS Version 5. or 6.x, or CD ROM, unless otherwise approved by the Contracting Officer.

3.5.1.2 Disk Label

A permanent exterior label shall be affixed to each disk submitted. The label shall indicate the type of schedule (Initial, Update, or Change), full contract number, project name, project location, data date, name and telephone number or person responsible for the schedule, and the MS-DOS version used to format the disk.

3.5.1.3 File Name

Each file submitted shall have a name related to either the schedule data date, project name, or contract number. The Contractor shall develop a

naming convention that will ensure that the names of the files submitted are unique. The Contractor shall submit the file naming convention to the Contracting Officer for approval.

3.5.2 Narrative Report

A Narrative Report shall be provided with each update of the project schedule. This report shall be provided as the basis of the Contractor's progress payment request. The Narrative Report shall include: a description of activities along the 4 most critical paths, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken.

3.5.3 Approved Changes Verification

Only project schedule changes that have been previously approved by the Contracting Officer shall be included in the schedule submission. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

3.5.4 Schedule Reports

The format for each activity for the schedule reports listed below shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float. Actual Start and Actual Finish Dates shall be printed for those activities in progress or completed.

3.5.4.1 Activity Report

A list of all activities sorted according to activity number and then sorted according to Early Start Date. For completed activities the Actual Start Date shall be used as the secondary sort.

3.5.4.2 Logic Report

A list of Preceding and Succeeding activities for every activity in ascending order by activity number and then sorted according to Early Start Date. For completed activities the Actual Start Date shall be used as the secondary sort.

3.5.4.3 Total Float Report

A list of all activities sorted in ascending order of total float. Activities which have the same amount of total float shall be listed in ascending order of Early Start Dates.

3.5.4.4 Earnings Report

A compilation of the Contractor's Total Earnings on the project from the Notice to Proceed until the most recent Monthly Progress Meeting. This report shall reflect the Earnings of specific activities based on the agreements made in the field and approved between the Contractor and

Contracting Officer's Representative at the most recent Monthly Progress Meeting. Provided that the Contractor has provided a complete schedule update, this report shall serve as the basis of determining Contractor Payment. Activities shall be grouped by bid item and sorted by activity numbers. This report shall: sum all activities in a bid item and provide a bid item percent; complete and sum all bid items to provide a total project percent complete. The printed report shall contain, for each activity: Activity Number, Activity Description, Original Budgeted Amount, Total Quantity.

3.5.5 Network Diagram

The network diagram shall be required on the initial schedule submission and on monthly schedule update submissions. The network diagram shall depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.5.1 Continuous Flow

Diagrams shall show a continuous flow from left to right with no arrows from right to left. The activity number or event number, description, duration, and estimated earned value shall be shown on the diagram.

3.5.5.2 Project Milestone Dates

Dates shall be shown on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.5.5.3 Critical Path

The critical path shall be clearly shown.

3.5.5.4 Banding

Activities shall be grouped to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

3.5.5.5 S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

3.6 PERIODIC PROGRESS MEETINGS

Progress meetings to discuss payment shall include a monthly onsite meeting or other regular intervals mutually agreed to at the preconstruction conference. During this meeting the Contractor shall describe, on an activity by activity basis, all proposed revisions and adjustments to the project schedule required to reflect the current status of the project. The Contracting Officer will approve activity progress, proposed revisions, and adjustments as appropriate.

3.6.1 Meeting Attendance

The Contractor's Project Manager and Scheduler shall attend the regular progress meeting.

3.6.2 Update Submission Following Progress Meeting

A complete update of the project schedule containing all approved progress, revisions, and adjustments, based on the regular progress meeting, shall be submitted not later than 4 working days after the monthly progress meeting.

3.6.3 Progress Meeting Contents

Update information, including Actual Start Dates, Actual Finish Dates, Remaining Durations, and Cost-to-Date shall be subject to the approval of the Contracting Officer. As a minimum, the Contractor shall address the following items on an activity by activity basis, during each progress meeting.

3.6.3.1 Start and Finish Dates

The Actual Start and Actual Finish dates for each activity currently in-progress or completed.

3.6.3.2 Time Completion

The estimated Remaining Duration for each activity in-progress. Time-based progress calculations must be based on Remaining Duration for each activity.

3.6.3.3 Cost Completion

The earnings for each activity started. Payment will be based on earnings for each in-progress or completed activity. Payment for individual activities will not be made for work that contains quality defects. A portion of the overall project amount may be retained based on delays of activities.

3.6.3.4 Logic Changes

All logic changes pertaining to Notice to Proceed on change orders, change orders to be incorporated into the schedule, contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, and other changes that have been made pursuant to contract provisions shall be specifically identified and discussed.

3.6.3.5 Other Changes

Other changes required due to delays in completion of any activity or group of activities are those delays beyond the Contractors control such as strikes and unusual weather. Also included are delays encountered due to submittals, Government Activities, deliveries or work stoppage which makes re-planning the work necessary, and when the schedule does not represent the actual prosecution and progress of the work.

3.7 REQUESTS FOR TIME EXTENSIONS

In the event the Contractor requests an extension of the contract completion date, he shall furnish such justification, project schedule data and supporting evidence as the Contracting Officer's Representative may deem necessary for a determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof of delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is obligatory to any approvals.

3.7.1 Justification of Delay

The project schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved with this request.

The Contracting Officer's Representative's determination as to the number of allowable days of contract extension, shall be based upon the project schedule updates in effect for the time period in question and other factual information. Actual delays that are found to be caused by the Contractor's own actions, which result in the extension of the schedule, shall not be a cause for a time extension to the contract completion date.

3.7.2 Submission Requirements

The Contractor shall submit a justification for each request for a change in the contract completion date of under 2 weeks based upon the most recent schedule update at the time of the Notice to Proceed or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

- a. A list of affected activities, with their associated project schedule activity number.
- b. A brief explanation of the causes of the change.
- c. An analysis of the overall impact of the changes proposed.
- d. A sub-network of the affected area.

Activities impacted in each justification for change shall be identified by a unique activity code contained in the required data file.

3.7.3 Additional Submission Requirements

For any requested time extension of over 2 weeks, the Contracting Officer may request an interim update with revised activities for a specific change request. The Contractor shall provide this disk within 4 days of the Contracting Officer's request.

3.8 DIRECTED CHANGES

If Notice to Proceed (NTP) is issued for changes prior to settlement of price and/or time, the Contractor shall submit proposed schedule revisions to the Contracting Officer's Representative within 2 weeks of the NTP being issued. The proposed revisions to the schedule will be approved by the

Contracting Officer's Representative prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer's Representative may furnish the Contractor suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until the Contractor submits revisions, and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer's Representative, then the Contractor shall advise the Contracting Officer's Representative within 2 weeks of receipt of the revisions. Regardless of the objections, the Contractor will continue to update their schedule with the Contracting Officer's Representative's revisions until a mutual agreement in the revisions may be made. If the Contractor fails to submit alternative revisions within 2 weeks of receipt of the Contracting Officer's Representative's proposed revisions, the Contractor will be deemed to have concurred with the Contracting Officer's Representative's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

3.9 OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

-- End of Section --

p

SECTION 01330

SUBMITTAL PROCEDURES
05/02

PART 1 GENERAL

1.1 SUBMITTAL IDENTIFICATION (SD)

Submittals required are identified by SD numbers and titles as follows:

SD-01 Preconstruction Submittals

SD-02 Shop Drawings

SD-03 Product Data

SD-04 Samples

SD-05 Design Data

SD-06 Test Reports

SD-07 Certificates

SD-11 Closeout Submittals

1.2 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.2.1 Designer of Record Approved

Designer of Record approval is required for extensions of design, critical materials, any deviations from the solicitation, the accepted proposal, or the completed design, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings". The Contractor shall provide the Government the number of copies designated hereinafter of all Designer of Record approved submittals. The Government may review any or all Designer of Record approved submittals for conformance to the Solicitation and Accepted Proposal. The Government will review all submittals designated as deviating from the Solicitation or Accepted Proposal, as described below. Design submittals shall be in accordance with Section 01012 DESIGN AFTER AWARD. Generally, design submittals should be identified as SD-05 DESIGN DATA submittals.

1.2.2 Government Approved

Government approval is required for any deviations from the Solicitation or Accepted Proposal and other items as designated by the Contracting Officer.

Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.2.3 Government Reviewed Design or Extension of Design

The Government will review all design submittals for conformance with the technical requirements of the solicitation. Section 01012 DESIGN AFTER AWARD covers the design submittal and review process in detail. Government review is required for extension of design construction submittals, used to define contract conformity, and for deviation from the completed design. Review will be only for conformance with the contract requirements. Included are only those construction submittals for which the Designer of Record design documents do not include enough detail to ascertain contract compliance. The Government may, but is not required, to review extensions of design such as structural steel or reinforcement shop drawings.

1.2.4 Information Only

All submittals not requiring Designer of Record or Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.3 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for design, dimensions, all design extensions, such as the design of adequate connections and details, etc., and the satisfactory construction of all work. After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.4 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer, obtain the Designer of Record's approval when applicable, and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. Any "information only" submittal found to contain errors or unapproved deviations from the Solicitation or Accepted Proposal shall be resubmitted as one requiring "approval" action, requiring both Designer of Record and Government approval. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.5 WITHHOLDING OF PAYMENT

No payment for materials incorporated in the work will be made if all required Designer of Record or required Government approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

1.6 GENERAL

The Contractor shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor's Quality Control (CQC) System Manager and the Designer of Record, if applicable, and each item shall be stamped, signed, and dated by the CQC System Manager indicating action taken. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Government approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

1.7 SUBMITTAL REGISTER

The Designer of Record shall develop a complete list of submittals during design. The Designer of Record shall identify required submittals in the specifications, and use the list to prepare the Submittal Register. The list may not be all inclusive and additional submittals may be required by other parts of the contract. The Contractor is required to complete the submittal register and submit it to the Contracting Officer for approval within 30 calendar days after Notice to Proceed. The approved submittal register will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period. The submit dates and need dates used in the submittal register shall be coordinated with dates in the Contractor prepared progress schedule. Updates to the submittal register showing the Contractor action codes and actual dates with Government action codes and actual dates shall be submitted monthly or until all submittals have been satisfactorily completed. When the progress schedule is revised, the submittal register shall also be revised and both submitted for approval.

1.8 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 30 calendar days exclusive of mailing time) shall be allowed and shown on the register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals.

1.9 TRANSMITTAL FORM (ENG FORM 4025)

The sample transmittal form (ENG Form 4025) attached to this section shall be used for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms are included in the QCS software that the Contractor is required to use for this contract. This form shall be properly completed by filling out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

1.10 SUBMITTAL PROCEDURES

Submittals shall be made as follows:

1.10.1 Procedures

The Government will further discuss detailed submittal procedures with the Contractor at the Preconstruction Conference.

1.10.2 Deviations

For submittals which include proposed deviations requested by the Contractor, the column "variation" of ENG Form 4025 shall be checked. The Contractor shall set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.11 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.12 GOVERNMENT APPROVED SUBMITTALS

If the Government performs a conformance review of other Designer of Record approved submittals, the submittals will be so identified and returned, as described above.

1.13 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals.

The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. For design-build construction the Government will retain six (6) copies of information only submittals.

1.14 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements shall be similar to the following:

CONTRACTOR
(Firm Name)
_____ Approved
_____ Approved with corrections as noted on submittal data and/or attached sheets(s).
SIGNATURE: _____
TITLE: _____
DATE: _____

For design-build construction, both the Contractor Quality Control System Manager and the Designer of Record shall stamp and sign to certify that the submittal meets contract requirements.

PART 2 PRODUCTS

NOT APPLICABLE

PART 3 EXECUTION

NOT APPLICABLE

-- End of Section --

**TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR
MANUFACTURER'S CERTIFICATES OF COMPLIANCE**

(Read instructions on the reverse side prior to initiating this form)

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <i>(Read instructions on the reverse side prior to initiating this form)</i>		DATE	TRANSMITTAL NO.
SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS <i>(This section will be initiated by the contractor)</i>			
TO:	FROM:	CONTRACT NO.	CHECK ONE: <input type="checkbox"/> THIS IS A NEW TRANSMITTAL <input type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL

[illegible]

REMARKS

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED <i>(List by Item No.)</i>	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.
2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No.". This number, in addition to the contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.
3. The "Item No." will be the same "Item No." as indicated on ENG FORM 4288 for each entry on this form.
4. Submittals requiring expeditious handling will be submitted on a separate form.
5. Separate transmittal form will be used for submittals under separate sections of the specifications.
6. A check shall be placed in the "Variation" column when a submittal is not in accordance with the plans and specifications--also, a written statement to that effect shall be included in the space provided for "Remarks".
7. Form is self-transmittal, letter of transmittal is not required.
8. When a sample of material or Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in column c, Section I.
9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in Section I, column i to each item submitted. In addition they will ensure enclosures are indicated and attached to the form prior to return to the contractor. The Contractor will assign action codes as indicated below in Section I, column g, to each item submitted.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

A	--	Approved as submitted.	E	--	Disapproved (See attached).
B	--	Approved, except as noted on drawings.	F	--	Receipt acknowledged.
C	--	Approved, except as noted on drawings. Refer to attached sheet resubmission required.	FX	--	Receipt acknowledged, does not comply as noted with contract requirements.
D	--	Will be returned by separate correspondence.	G	--	Other (Specify)

10. Approval of items does not relieve the contractor from complying with all the requirements of the contract plans and specifications.

SUBMITTAL REGISTER

CONTRACT NO.
DACA31-03-B-0000

TITLE AND LOCATION RENOVATE / EXPAND FIRE STATION, FORT DETRICK, MD						CONTRACTOR											
A C T I V I T Y N O	T R A N S M I T T A L N O	S P E C S E C T	DESCRIPTION	P A R A G R A P H	C L A S S I F I C A T I O N / R E V I E W N O	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR	REMARKS	
						SUBMIT (g)	BY (h)	MATERIAL NEEDED (i)	A C T I O N C O D E (j)	DATE OF ACTION (k)	DATE RCD FROM CONTR (l)	DATE FWD TO APPR AUTH/ (m)	DATE RCD FROM OTH REVIEWER (n)	A C T I O N C O D E (o)			DATE OF ACTION (p)
	01000		SD-01 Preconstruction Submittals														
			Title Evidence														
			Invoice Copies														
			Payment Evidence														
			Photographs	1.12													
			SD-03 Product Data														
			Cost or Pricing Data	1.6													
			Equipment Data	1.7													
			SD-05 Design Data														
			Progress Schedule	1.2	G AR												
			SD-10 Operation and Maintenance Data														
			O and M Data	1.8													
	01050		SD-01 Preconstruction Submittals														
			Shut Down Utility Services	1.4.2	G AR												
			Advance Notice	1.4.3													
			Checklist	1.4.4	G AR												
			Control Records														
			SD-07 Certificates														
			Operations Statement														
	01060		SD-01 Preconstruction Submittals														
			Safety Supervisor	1.3	G AR												
			SD-07 Certificates														
			Language Certification	1.3													
			SD-09 Manufacturer's Field Reports														

SUBMITTAL REGISTER

CONTRACT NO.
DACA31-03-B-0000

TITLE AND LOCATION RENOVATE / EXPAND FIRE STATION, FORT DETRICK, MD						CONTRACTOR											
A C T I V I T Y N O	T R A N S M I T T A L N O	S P E C S E C T	DESCRIPTION	P A R A G R A P H	G O V T C L A S S I F I C A T I O N / R E V I E W N O	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR	REMARKS	
						SUBMIT (g)	BY (h)	MATERIAL NEEDED (i)	A C T I O N C O D E (j)	DATE OF ACTION (k)	DATE RCD FROM CONTR (l)	DATE FWD TO APPR AUTH/ (m)	DATE RCD FROM OTH REVIEWER (n)	A C T I O N C O D E (o)			DATE OF ACTION (p)
		01060	Activity Phase Hazard Analysis Plan	1.3	G AR												
			Outline Report														
			OSHA Log														
		01459	SD-01 Preconstruction Submittals														
			CQC Plan	3.2	G AR												
			Phase Notification Request		G AR												
			Minutes														
			CQC Mgr Qualification														
			SD-04 Samples														
			CQC Mgr Qualification		G AR												
			SD-05 Design Data														
			Change Notification														
			Punchlist	3.8.1													
			SD-06 Test Reports														
			Tests	3.7.1													
			Test Reports	3.7.1													
			Tests Performed	3.7.1													
			QC Records		G AR												
			SD-07 Certificates														
			CQC Plan	3.2	G AR												
			CQC Mgr Qualification		G AR												
		01510	SD-02 Shop Drawings														
			Temporary Electrical Work	1.5	G AR												
		01561	SD-05 Design Data														

SUBMITTAL REGISTER

CONTRACT NO.
DACA31-03-B-0000

TITLE AND LOCATION

RENOVATE / EXPAND FIRE STATION, FORT DETRICK, MD

CONTRACTOR

[illegible]

SECTION 01420

SOURCES FOR REFERENCE PUBLICATIONS

02/02

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization, (e.g. ASTM B 564 Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the standards producing organization should be ordered from the source by title rather than by number. The designations "AOK" and "LOK" are for administrative purposes and should not be used when ordering publications.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959
Ph: 610-832-9585
Fax: 610-832-9555
Internet: <http://www.astm.org>
AOK 5/01
LOK 3/01

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)
Yeon Bldg.
522 SW 5th Ave.
Suite 500
Portland, OR 97204-2122
Ph: 503-224-3930
Fax: 503-224-3934
Internet: <http://www.wwpa.org>
e-mail: info@wwpa.org
AOK 5/01
LOK 6/00

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)
1400 East Touhy Ave., Suite 470
Des Plaines, IL 60018

Ph: 847-299-5200 or 800-223-2301
Fax: 708-299-1286
Internet: <http://www.wdma.com>
e-mail: admin@wdma.com
AOK 5/01
LOK 6/00

WOOD MOULDING AND MILLWORK PRODUCERS ASSOCIATION (WMMPA)
507 First Street
Woodland, CA 95695
Ph: 916-661-9591
Fax: 916-661-9586
Internet: <http://www.wmmpa.com>
AOK 5/01
LOK 6/00

-- End of Section --

SECTION 01459

CONTRACTOR QUALITY CONTROL - DESIGN BUILD CONSTRUCTION
06/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740 (2001) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

ASTM E 329 (2000b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

No separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Price Schedule.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

CQC Plan; G AR.

Identifies personnel, procedures, control, instructions, test, records, and forms to be used.

Phase Notification.

The Government shall be notified in a specified amount of time in advance of beginning the preparatory control phase.

Request; G AR.

The requesting of specialized individuals in specific disciplines to perform quality control.

Minutes.

Prepared by the Government and signed by both the Contractor and the Contracting Officer and shall become a part of the contract file.

CQC Mgr Qualification.

The evaluation of the project to determine the level of CQC System Manager required.

SD-04 Samples

CQC Mgr Qualification; G AR.

The evaluation of the project to determine the level of CQC System Manager required.

SD-05 Design Data

Change Notification.

Any changes made by the Contractor.

Punchlist.

Near the completion of all work, the CQC System Manager shall prepare a list of items which do not conform to the approved drawings and specifications.

SD-06 Test Reports

Tests.

Specified or required tests shall be done by the Contractor to verify that control measures are adequate.

Test Reports.

Results of tests taken..

Tests Performed.

An information copy provided directly to the Contracting Officer.

QC Records; G AR.

Provide factual evidence that required quality control activities and/or tests have been performed.

SD-07 Certification

CQC Plan; G AR.

Identifies personnel, procedures, control, instructions, test, records, and forms to be used..

CQC Mgr Qualification; G AR.

The evaluation of the project to determine the level of CQC System Manager required.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all design and construction operations, both onsite and offsite, and shall be keyed to the proposed design and construction sequence. The site project superintendent will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with quality requirements specified in the contract. The site project superintendent in this context shall mean the highest level manager at the site responsible for the overall construction activities, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.2 CQC PLAN

3.2.1 General

The Contractor shall furnish for review by the Government, not later than 10 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used. The Government will consider an interim plan for the first 60 days of operation. Design and construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

3.2.2 Design Quality Control (DQC) Plan

The Contractor's DQC Plan shall provide and maintain an effective quality control program, which will assure that all services required by this design-build contract are performed and provided in a manner that meets

professional architectural and engineering quality standards. As a minimum, competent, independent reviewers identified in the DQC Plan shall review all documents. The same element that produced the product shall not perform the independent technical review (ITR). In addition, the DQC Plan shall incorporate the Lessons Learned Databases provided by the Government. The Contractor shall correct errors and deficiencies in the design documents prior to submitting them to the Government.

The Contractor shall include the design schedule in the master project schedule, showing the sequence of events involved in carrying out the project tasks within the specific contract period. This should be at a detailed level of scheduling sufficient to identify all major tasks including those that control the flow of work. The schedule shall include review and correction periods associated with each item. This should be a forward planning as well as a project-monitoring tool. If the schedule is changed, the Contractor shall submit a revised schedule reflecting the change within seven calendar days. The Contractor shall include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. The completed checklists shall be submitted at each design phase as part of the project documentation. Example checklists can be found in ER 1110-1-12.

The DQC Plan shall be implemented by an assigned person with the Contractor's organization who shall be cognizant of and assure that all documents on the project have been coordinated. This individual shall be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect. The Contractor shall notify the Contracting Officer, in writing, of the name of the individual and the name of an alternate person assigned to the position.

The Contracting Officer will notify the Contractor, in writing, of the acceptance of the DQC Plan. After acceptance, any changes proposed by the Contractor are subject to the acceptance of the Contracting Officer.

3.2.3 Content of the CQC Plan

The CQC plan shall include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, designers of record, consultants, architect/engineer's (A/E's), fabricators, suppliers, and purchasing agents (The design QC Plan shall incorporate appropriate portions of these requirements, applicable to design activities):

- a. describe the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of construction work. The staff shall include a CQC System Manager who shall report to the site project superintendent.
- b. List the name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.
- c. Include a copy of the letter to the CQC System Manager signed by

an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Furnish copies of these letters to the Government.

- d. Describe procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, designers of record, consultants, A/E's, off-site fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01330 - SUBMITTAL PROCEDURES.
- e. Describe control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (The Contracting Officer must approve Laboratory facilities.)
- f. Describe procedures for tracking preparatory, initial, and follow-up control phases for construction and control, verification, and acceptance tests including documentation.
- g. Describe procedures for tracking design and construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.
- h. Describe reporting procedures, including proposed reporting formats. The Contractor shall utilize the Contractor Module of a Government-furnished software program titled "RMS" (Resident Management System). See paragraph, IMPLEMENTATION OF GOVERNMENT RESIDENT MANAGEMENT SYSTEM FOR CONTRACTOR QUALITY CONTROL OF CONTRACT, of this section for additional details.
- i. Include a list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting. This list may be developed as design progresses, but prior to construction of that feature.
- j. Furnish a list of tests to be performed as a part of the CQC Plan. The list shall give the test name, frequency, specification paragraph containing the test requirement, the personnel and laboratory responsible for each type of test, and an estimate of the number of tests required. Develop this list as design

progresses, but prior to construction of that feature.

- k. RMS will assist in tracking and reporting for the above requirements. Sample forms generated from the software package shall be used as part of the CQC Plan.

3.2.4 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of design and/or construction. Acceptance is conditional and will be predicated on satisfactory performance during the design and construction phases. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.5 Notification of Changes

After acceptance of the CQC Plan, the Contractor shall notify the Contracting Officer in writing a minimum of seven (7) calendar days prior to any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Pre-design Conference, before start of design and/or construction, and prior to acceptance by the Government of the Quality Control Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of 10 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, design activities, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. The Government will prepare the minutes of the meeting. Both the Contractor and the Contracting Officer shall sign them. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 General

The requirements for the CQC organization are a CQC System Manager, a Design Quality Manager and sufficient number of additional qualified personnel to ensure contract compliance. The Contractor's CQC organization shall maintain a presence at the site at all times during progress of the work and which shall have complete authority to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the on site work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of 5 years construction experience on construction similar to this contract. This CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties. An alternate for the CQC System Manager will be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate will be the same as for the designated CQC Manager.

3.4.3 CQC Personnel

In addition to CQC personnel previously specified, the Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager in the areas listed below. These personnel may be employees of the prime Contractor or subcontractors. The CQC specialists shall be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan or they may be assigned only CQC duties, at the Contractor's option. The Contractor may elect for a person to perform one or more of the functions listed below, provided that the person meets the appropriate qualifications and has adequate time to properly cover the function.

Experience Matrix

<u>Area</u>	<u>Minimum Qualifications</u>
a. Civil	Graduate Civil Engineer with 2 years experience in the type of work being performed on this project or technician with 5 yrs related experience
b. Mechanical	Graduate Mechanical Engineer with 2 yrs experience or person with 5 yrs related experience
c. Electrical	Graduate Electrical Engineer with 2 yrs related experience or person with 5 yrs related experience

Experience Matrix

<u>Area</u>	<u>Minimum Qualifications</u>
d. Structural	Graduate Structural Engineer with 2 yrs experience or person with 5 yrs related experience
e. Architectural	Graduate Architect with 2 yrs experience or person with 5 yrs related experience
f. Environmental	Graduate Environmental Engineer with 3 yrs experience
g. Submittals	Submittal Clerk with 1 yr experience
h. OMITTED	
i. Concrete, Pavements and Soils	Materials Technician with 2 yrs experience for the appropriate area
j. Testing, Adjusting and Balancing Personnel	Specialist must be a member of AABC or an experienced technician of the by the NEBB.
k. Design QC	Registered Architect or Professional Engineer

3.4.4 Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management for Contractors" within 45 calendar days after NTP is a mandatory requirement for the position of the Quality Control Systems Manager. Certification is good for five (5) years at which time re-training is required. The Contractor's QC Systems Manager may be appointed and serve fully in that capacity pending certification. If the CQC Systems Manager fails to successfully complete the training, the Contractor should promptly appoint a new CQSM who shall then attend the next available course. The course is nine (9) hours long (1 day). The Construction Quality Management Course (CQMC) will be taught at least nine (9) times per year by the Baltimore District Corps of Engineers, at various locations around Baltimore and Washington, D.C., or at another site if conditions warrant. The CQMC cost will be borne by the Contractor and is one hundred and thirty five dollars (\$135.00) per course, per person. Payment shall be made by check payable to either sponsors of the course; Associated Builders and Contractors, Inc., (ABC) 14120 Park Long Court,

Suite 111, Chantilly, Virginia 20151 (Phone: 703-968-6205), or to the Associated General Contractors of America (GCA), Maryland Chapter, 1301 York Road, Heaver Plaza, Suite 202, Lutherville, Maryland 21093 (Phone: 410-321-7870) prior to the start of the course. Reservations to attend the course should be made directly to the organization sponsoring the course they attend. The Contractor has forty-five (45) calendar days to attend the course after the issuance of the NTP. The Contractor shall contact the Contracting Officer upon award of the contract arrangements for the course.

3.4.5 Organizational Changes

The Contractor shall obtain Contracting Officer's acceptance before replacing any member of the CQC staff. Requests shall include the names, qualifications, duties, and responsibilities of each proposed replacement. Upon acceptance of any changes, the Contractor shall revise the CQC plan to accurately reflect the changes. The CQC plan shall be kept current at all times during the life of the contract.

3.5 SUBMITTALS

Submittals, if needed, shall be made as specified in Section 01330 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals and deliverables are in compliance with the contract requirements.

3.6 CONTROL CONSTRUCTION

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The CQC System Manager shall conduct at least three phases of control for each definable feature of construction work, as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

- a. Review each paragraph of applicable specifications, reference codes and standards. The Contractor shall make available and maintain a copy, in the field, of the referenced codes and standards applicable to the work to be accomplished, until final acceptance of the work.
- b. A review of the contract drawings.
- c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.
- d. Review of provisions that have been made to provide required control inspection and testing.

- e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
- f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- g. A review of the appropriate activity hazard analysis to assure safety requirements are met.
- h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.
- i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
- j. Discussion of the initial control phase.
- k. The Government shall be notified at least 48 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

- a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.
- b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.
- c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
- d. Resolve all differences.
- e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
- f. The Government shall be notified at least 24 hours in advance of

beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

- g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if the quality of on-going work is unacceptable, if there are changes in the applicable CQC staff, onsite production supervision or work crew, if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. The Contractor shall perform the following activities and record and provide the following data:

- a. Verify that testing procedures comply with contract requirements.
- b. Verify that facilities and testing equipment are available and comply with testing standards.
- c. Check test instrument calibration data against certified standards.
- d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
- e. Results of all tests taken, both passing and failing tests, shall

be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test shall be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility shall be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract. The Contractor shall include a copy of the laboratory's latest Corps of Engineers inspection report in the Quality Control Plan. The inspection report details the tests that the lab has been validated to perform under Corps of Engineers contracts.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2 Laboratory Approval

The Contractor shall use a testing laboratory that has been previously approved by the Corps of Engineers or obtain approval for a laboratory established at the project site. Approved laboratories are listed at the following web site: <http://www.wes.army.mil/SL/MTC/ValStatesTbl.htm> If the Contractor elects to set up an on-site laboratory at the project site, the Contractor will be assessed \$4500.00 for the cost of inspection of this lab by the Corps of Engineers.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Furnishing or Transportation of Samples for Testing: Costs incidental to the transportation of samples or materials will be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to the following address:

Field Exploration Unit
or
Soils Laboratory Unit
(indicate which on shipping or mailing forms)

Fort McHenry Yard
Baltimore, Maryland 21230"

Coordination for each specified test, exact delivery location, and dates will be made through the Government's Area/Resident Office.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the completion of all work or any increment thereof established by a completion time stated in the Special Clause in Section 00800 of the Solicitation entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the CQC System Manager shall conduct an inspection of the work and develop a punchlist of items which do not conform to the approved drawings and specifications. Such a list of deficiencies shall be included in the CQC documentation, as required by paragraph DOCUMENTATION below, and shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government so that a Final inspection with the customer can be scheduled. Any items noted on the Pre-Final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be

cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers. The QCS module includes a quality control report format , including, as a minimum, the following information:

- a. Contractor/subcontractor and their area of responsibility.
- b. Operating plant/equipment with hours worked, idle, or down for repair.
- c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.
- d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase shall be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.
- e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
- g. Off-site surveillance activities, including actions taken.
- h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- i. Instructions given/received and conflicts in plans and/or specifications.
- j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Furnish the original and one copy of these records in report form to the Government at the beginning of the next day after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, submit one report for every 7 days of no work and on the last day of a no work period. Account for all calendar days throughout the life of the contract. The first report

following a day of no work shall be for that day only. The CQC System Manager shall sign and date all reports. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.10 SAMPLE FORMS

Sample forms enclosed at the end of this section.

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

-- End of Section --

02/2002

Contractor's Name:	_____
Address:	_____ _____
Phone Number:	_____

CONSTRUCTION QUALITY CONTROL REPORT

PROJECT NAME: _____
LOCATION: _____ DATE: _____
CONTRACT NUMBER: _____ REPORT NO.: _____

SUPERINTENDENT: _____			
TYPE OF WORKERS	NUMBER	TYPES OF CONSTRUCTION EQUIPMENT ON SITE	NUMBER
SUBCONTRACTORS			
COMPANY	RESPONSIBILITY	FOREMAN	NO. OF WORKERS
TOTALS			
NO. OF WORKERS TODAY	MANHOURS TODAY	MANHOURS FOR THIS PERIOD	
CONTRACT MATERIALS AND EQUIPMENT DELIVERED TO SITE:			
WEATHER: _____ SITE CONDITIONS: _____			
DID A DELAY OR WORK STOPPAGE OCCUR TODAY? _____ IF YES, EXPLAIN.			
HAS ANYTHING DEVELOPED IN THE WORK WHICH MAY LEAD TO A CHANGE OR FINDING OF FACT? _____ IF YES, EXPLAIN.			

DESCRIPTION OF ALL WORK PERFORMED TODAY
(LIST BY DEFINABLE FEATURES OF WORK)

PREPARATORY INSPECTION:

LIST ALL INSPECTIONS BY SUBJECT AND SPECIFICATION LOCATION.
ATTACH MINUTES OF MEETING AND LIST OF ALL ATTENDEES.

HAVE ALL REQUIRED SUBMITTALS AND SAMPLES OF CONSTRUCTION BEEN
APPROVED.

DO THE MATERIALS AND EQUIPMENT TO BE USED CONFORM TO THE SUBMITTALS?

HAS ALL PRELIMINARY WORK BEEN INSPECTED, TESTED, AND COMPLETED?

TEST REQUIRED AND INSPECTION TECHNIQUES TO BE EXECUTED TO PROVE
CONTRACT COMPLIANCE (INCLUDE BOTH EXPECTED AND ACTUAL RESULTS)

HAS A PHASE HAZARD ANALYSIS BEEN PERFORMED?

COMMENTS AND DEFICIENCIES NOTED AND CORRECTIVE ACTIONS TAKEN:

ALL INSTRUCTIONS RECEIVED FROM QA PERSONNEL AND ACTIONS TAKEN:

JOB SAFETY (INCLUDE MEETINGS HELD AND DEFICIENCIES NOTED WITH
CORRECTIVE ACTIONS):

INITIAL INSPECTION:

LIST ALL INSPECTIONS BY SUBJECT AND SPECIFICATION LOCATION.
COMMENTS AND/OR DEFICIENCIES NOTED AND CORRECTIVE ACTION TAKEN:

FOLLOW-UP INSPECTION:

LIST ALL INSPECTIONS BY SUBJECT AND SPECIFICATION LOCATION.
COMMENTS AND/OR DEFICIENCIES NOTED AND CORRECTIVE ACTION TAKEN.

SIGNATURE: _____
QUALITY CONTROL REPRESENTATIVE/MANAGER

THE ABOVE REPORT IS COMPLETE AND CORRECT. ALL MATERIALS AND
EQUIPMENT USED AND ALL WORK PERFORMED DURING THIS REPORTING PERIOD
ARE IN COMPLIANCE WITH THE CONTRACT SPECIFICATIONS, AND SUBMITTALS,
EXCEPT AS NOTED ABOVE.

SIGNATURE: _____
CONTRACTOR'S APPROVED AUTHORIZED REPRESENTATIVE

SECTION 01510

TEMPORARY CONSTRUCTION ITEMS

09/02

PART 1 GENERAL

1.1 General

The work covered by this section consists of furnishing all labor, materials, equipment, and services and performing all work required for or incidental to the items herein specified. No separate payment will be made for the construction and services required by this section, and all costs in connection therewith shall be included in the overall cost of the work unless specifically stated otherwise.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Temporary Electrical Work; G AR.

The Contractor shall submit a temporary power distribution sketch prior to the installation of any temporary power.

1.3 PROJECT SIGN: (AUG 1974)

A project sign shall be provided and erected at a location designated by the Contracting Officer. The sign shall conform to the requirements as shown on Attachment No. 1, a copy of which is attached hereto. The sign shall be erected as soon as possible and within 15 days after the date of receipt of notice to proceed. Upon completion of the project, the sign shall be removed and disposed of by the Contractor. (CENAB)

1.4 SAFETY SIGN (AUG 1974)

A safety sign shall be provided and erected at a location designated by the Contracting Officer. The sign shall conform to the requirements as shown on Attachment No. 2, a copy of which is attached hereto. The sign shall be erected as soon as possible and within 15 days after the date of receipt of notice to proceed. The data required by the sign shall be corrected daily, with light colored metallic or non-metallic numerals. Numerals, including mounting hardware, shall be subject to the approval of the Contracting Officer. Upon completion of the project, the sign shall be removed and disposed of by the Contractor. (CENAB)

1.5 TEMPORARY ELECTRICAL WORK: (APR 1962 REV JUL 2000)

Temporary electrical work shall be in accordance with Sections 7 and 11 of EM 385-1-1 U.S. Army Corps of Engineers Safety and Health Requirements Manual. The Contractor shall submit for approval a temporary power distribution sketch prior to the installation of any temporary power. The sketch shall include location, voltages, and means of protection for all temporary distribution system wiring and components to include lighting, receptacles, grounding, disconnecting means, and GFCIs. The Contractor shall test the temporary power system and devices for polarity, ground continuity, and ground resistance prior to the initial use and before use after any modification. The Contractor shall verify to the satisfaction of the Contracting Officer or his representative by a calibrated light meter that the minimum illumination required by Table 7-1 of the EM 385-1-1 is being provided.(CENAB-EN-DT)

1.6 GOVERNMENT FIELD OFFICE

1.6.1 Resident Engineer's Office

The Contractor shall provide the Government Resident Engineer with an office, approximately 200 square feet in floor area, located where directed, and providing space heat, electric light and power, toilet facilities consisting of one lavatory and one water closet complete with connections to water and sewer mains. A mail slot shall be provided in the door, or an apartment-type lockable mail box mounted on the surface of the door. At completion of the project, the office shall remain the property of the Contractor and shall be removed from the site. All utility connections shall be connected and disconnected in accordance with local codes and to the satisfaction of the Contracting Officer. If a window style air conditioner is used then the refrigerant shall be one of the fluorocarbon gases that is in accordance with FS BB-F-1421 and has an Ozone Depletion Potential (ODP) of less than or equal to 0.05.

1.6.2 Trailer-Type Mobile Office (Contractor's Option)

In lieu of constructing, maintaining and, at end of construction period, removing a temporary type field office, the Contractor may, at his option, furnish and maintain a trailer-type mobile office acceptable to the Contracting Officer and providing as a minimum the facilities specified above. The trailer shall be securely anchored to the ground at all four corners to guard against movement during high winds.

1.7 TEMPORARY PAVING PATCH

The Contractor shall place a temporary patch of cold mixed asphalt of adequate size and thickness immediately after utility trenches or other road or paved area openings are backfilled and compacted as specified in DIVISION II. The temporary patch shall be maintained by the Contractor until he permanently repairs the opening as delineated in DIVISION II. (SUGG NO. 75-183)

1.8 HAUL ROADS (1967)

The Contractor shall, at his expense, construct such access roads and haul roads as may be necessary for proper prosecution of the work under this contract. Haul roads shall be constructed in a workmanlike manner with suitable grades and widths. Sharp curves, blind corners, and dangerous cross traffic shall be avoided. The Contractor shall provide all necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control although optional shall be adequate to insure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval of the Contracting Officer. Lighting shall be adequate to assure full and clear visibility for full width of haul and work areas during any night work operations. Upon completion of the work, haul roads as designated by the Contracting Officer shall be removed at the expense of the Contractor.(CENAB)

1.9 BARRICADES

The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazardous areas during both day and night. (CENAB)

PART 2 PRODUCT
NOT APPLICABLE

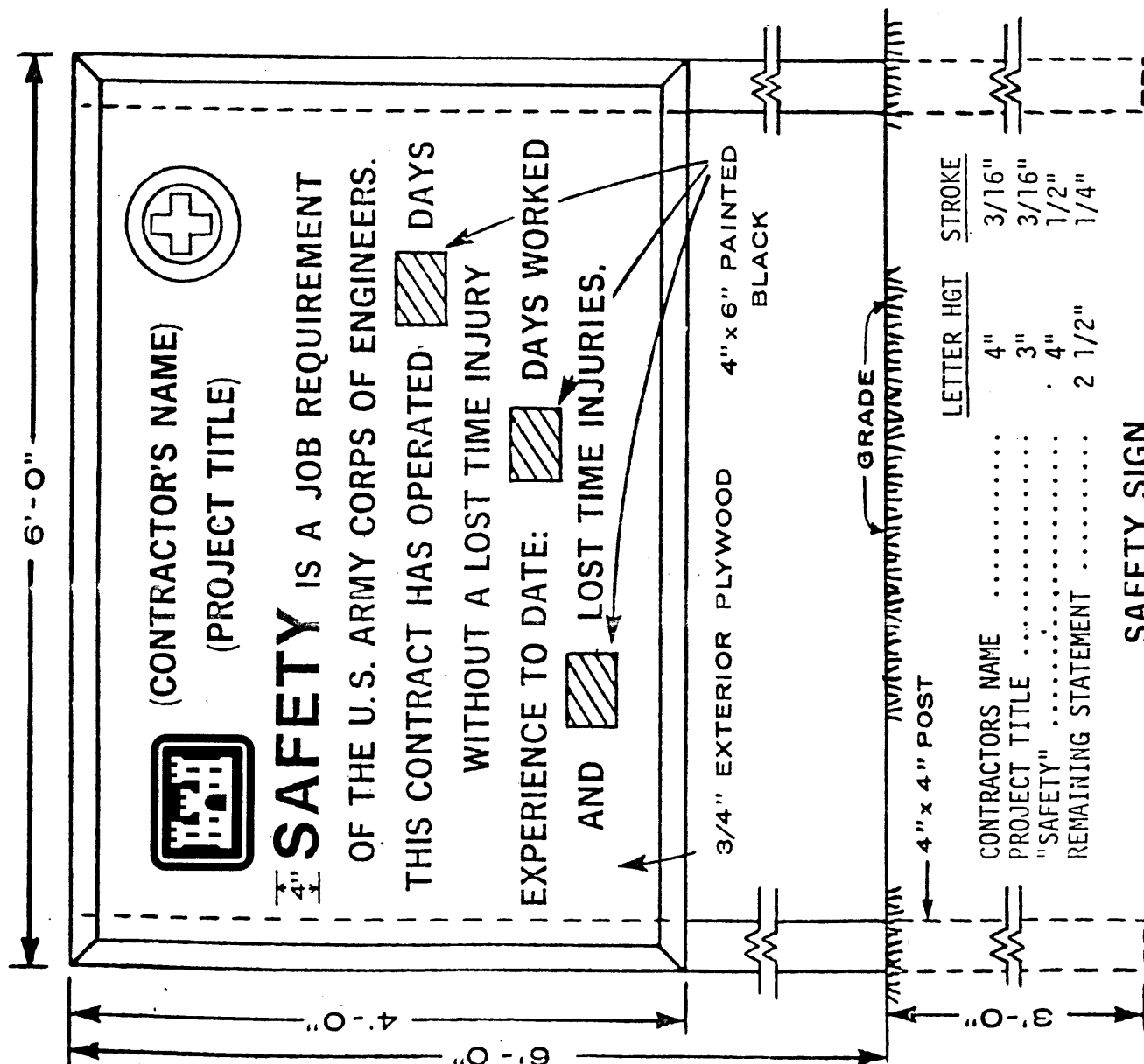
PART 3 EXECUTION
NOT APPLICABLE

ATTACHMENTS:

Attachment 1 Project Sign

Attachment 2 Safety Sign

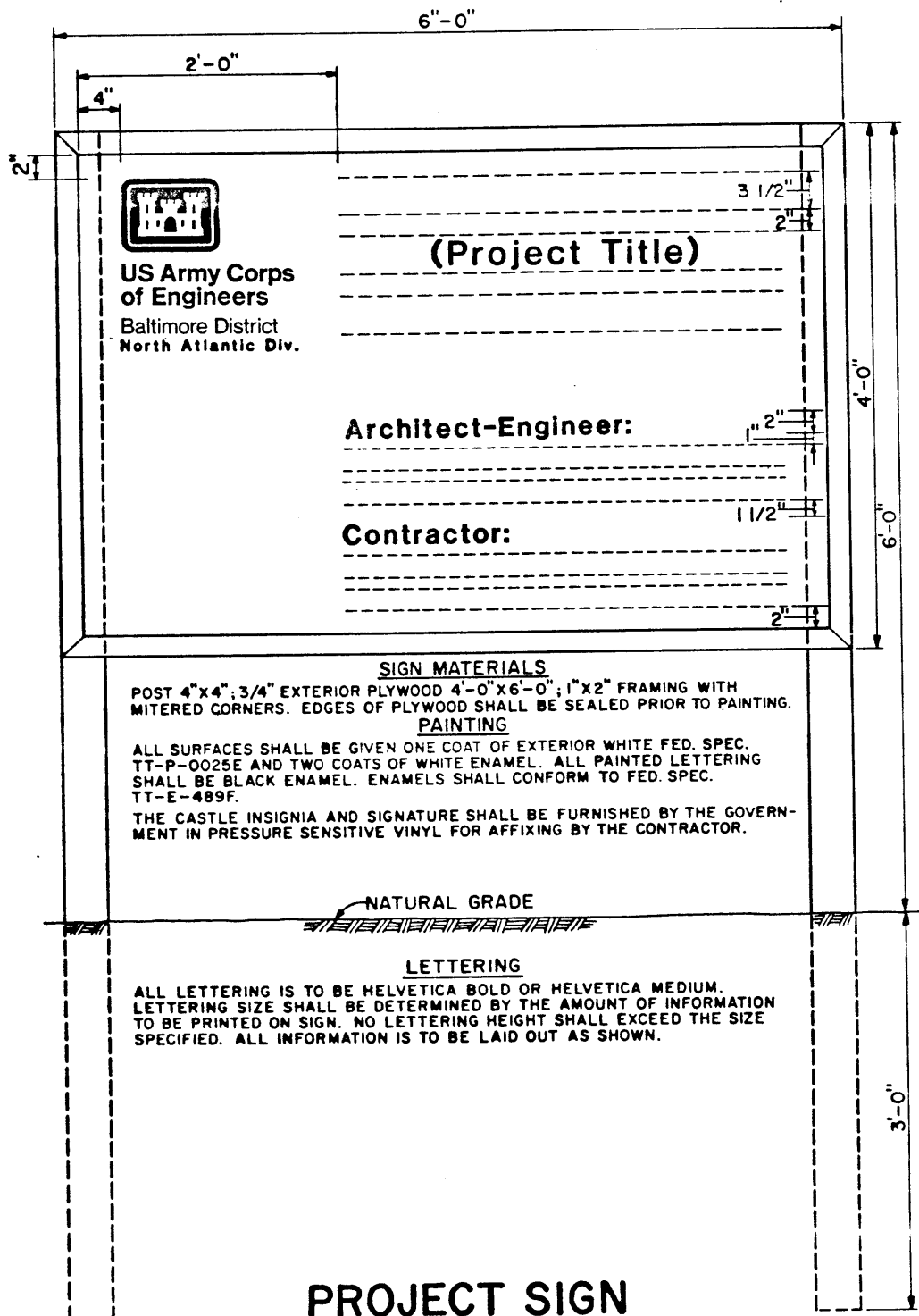
-- End of Section --



SIGN MATERIALS

POST 4"x4"; 3/4" EXTERIOR PLYWOOD 4'-0"x6'-0", 2"x2" FRAMING WITH MITERED CORNERS. FRAMING ENCLOSED EDGES OF PLYWOOD AND BE INSTALLED FLUSH ON BACK SIDE AND PROJECTING IN FRONT. OUTSIDE WHITE, HOUSE PAINT-2 COATS; BOTH SIDES AND EDGES; COLORS IN OIL FOR LETTERING - LAMP BLACK AND BULLETIN RED; CASTLE SHALL BE RED; LETTERING SHALL BE BLACK; THE CROSS SHALL BE GREEN

THE CASTLE INSIGNIA SHALL BE FURNISHED BY THE GOVERNMENT IN PRESSURE SENSITIVE VINYL FOR AFFIXING BY THE CONTRACTOR.



SECTION 01561

ENVIRONMENTAL PROTECTION
01/01

PART 1 GENERAL

The work covered by this section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution during, and as the result of, construction operations under this contract except for those measures set forth in the Technical Provisions of these specifications. For the purpose of this specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life or affect other species of importance to man. The control of environmental pollution requires consideration of air, water, and land.

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-05 Preconstruction Submittals

Facility Plan; G AR.

Location of storage and service facilities.

Temporary Plan; G AR.

Temporary excavation and embankments.

1.2 APPLICABLE REGULATIONS

The Contractor and his subcontractors in the performance of this contract, shall comply with all applicable Federal, State, and local laws and regulations concerning environmental pollution control and abatement in effect on the date of this solicitation, as well as the specific requirements stated elsewhere in the contract specifications.

1.3 NOTIFICATION

The Contracting Officer will notify the Contractor of any non-compliance with the foregoing provisions and the action to be taken. The Contractor shall, after receipt of such notice, immediately take corrective action. If the Contractor fails or refuses to comply promptly, the Contracting

Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of time lost due to any such stop order shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance.

1.4 SUBCONTRACTORS

Compliance with the provisions of this section by subcontractors will be the responsibility of the Contractor.

1.5 PROTECTION OF WATER RESOURCES

The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acid construction wastes or other harmful materials. All work under this contract shall be performed in such a manner that objectionable conditions will not be created in streams through or adjacent to the project areas.

1.6 EROSION AND SEDIMENTATION CONTROL

The Contractor shall accomplish the erosion and sedimentation control in accordance with the contract drawings. At the outset of construction, the Contractor will be required to accept by signature a [Transfer of Authority] [_____] letter. The acceptance of the [Transfer of Authority] [_____] places responsibility on the Contractor to fully adhere to the provisions of the General Permit for erosion and sedimentation control and stormwater management.

1.7 BURNING

Burning will be allowed only if permitted in other sections of the specifications or authorized in writing by the Contracting Officer. The specific time, location and manner of burning shall be subject to the approval of the Contracting Officer. Fires shall be confined to a closed vessel, guarded at all times and shall be under constant surveillance until they have burned out or have been extinguished. All burning shall be so thorough that the materials will be reduced to ashes.

1.8 DUST CONTROL

The Contractor shall maintain all work area free from dust which would contribute to air pollution. Approved temporary methods of stabilization consisting of sprinkling, chemical treatment, light bituminous treatment or similar methods will be permitted to control dust. Sprinkling, where used, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

1.9 PROTECTION OF LAND RESOURCES

1.9.1 General

It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this contract be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the project. Insofar as possible, the Contractor shall confine his construction activities to areas defined by the plans and specifications or to be cleared for other operations. The following additional requirements are intended to supplement and clarify the requirements of the CONTRACT CLAUSES:

1.9.2 Protection of trees retained

1.9.2.1 Contractors Responsibility

The Contractor shall be responsible for the protection of the tops, trunks and roots of all existing trees that are to be retained on the site. Protection shall be maintained until all work in the vicinity has been completed and shall not be removed without the consent of the Contracting Officer. If the Contracting Officer finds that the protective devices are insufficient, additional protection devices shall be installed.

1.9.2.2 Stockpiling

Heavy equipment, vehicular traffic, or stockpiling of any materials shall not be permitted within the drip line of trees to be retained.

1.9.2.3 Storage

No toxic materials shall be stored within 100 feet (30.5 m) from the drip line of trees to be retained.

1.9.2.4 Confined Area

Except for areas shown on the plans to be cleared, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without special authority. Existing near by trees shall not be used for anchorage unless specifically authorized by the Contracting Officer. Where such special emergency use is permitted, the Contractor shall first adequately protect the trunk with a sufficient thickness of burlap over which softwood cleats shall be tied.

1.9.2.5 Tree Defacing

No protective devices, signs, utility boxes or other objects shall be nailed to trees to be retained on the site.

1.9.3 Restoration of landscape damage

Any trees or other landscape feature scarred or damaged by the Contractor's operations shall be restored as nearly as possible to its original condition at the Contractor's expense. The Contracting Officer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of. All scars

made on trees, designated on the plans to remain, and all cuts for the removal of limbs larger than 1-inch in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted. Where tree climbing is necessary, the use of climbing spurs will not be permitted. Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by the Contractor and are beyond saving in the opinion of the Contracting Officer, shall be immediately removed and replaced with a nursery-grown tree of the same species. Replacement trees shall measure no less than 2 inches in diameter at 6 inches above the ground level.

1.9.4 Location of Storage and Services Facilities

The location on Government property of the Contractor's storage and service facilities, required temporarily in the performance of the work, shall be upon cleared portions of the job site or areas to be cleared. The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the construction of buildings. A facility plan showing storage and service facilities shall be submitted for approval to the Contracting Officer. Where buildings or platforms are constructed on slopes, the Contracting Officer may require cribbing to be used to obtain level foundations. Benching or leveling of earth may not be allowed, depending on the location of the proposed facility.

1.9.5 Temporary Excavation and Embankment

If the Contractor proposes to construct temporary roads, embankments or excavations for plant and/or work areas, he shall submit a temporary plan for approval prior to scheduled start of such temporary work.

1.10 MEASUREMENT AND PAYMENT

Except as noted in paragraph, PERFORMANCE AND PAYMENT BOND REIMBURSEMENT above, no separate measurement and payment will be made for the work performed in this Section 01561, ENVIRONMENTAL PROTECTION specified herein and all costs in connection therewith shall be considered a subsidiary obligation of the Contractor, and shall be included in the overall cost of the work.

PART 2 PRODUCT
NOT APPLICABLE

PART 3 EXECUTION
NOT APPLICABLE

-- End of Section --

SECTION 01720

AS-BUILT DRAWINGS - CADD
01/01

PART 1 GENERAL

1.1 Preparation

This section covers the preparation of as-built drawings complete, as a requirement of this contract. The terms "drawings," "contract drawings," "drawing files," and "final as-built drawings" refer to a set of computer-aided design and drafting (CADD) contract drawings in electronic file format which are to be used for as-built drawings.

1.2 PROGRESS MARKED UP AS-BUILT PRINTS

The Contractor shall revise one set of paper prints to show the as-built conditions during the prosecution of the project. These as-built marked prints shall be kept current and available on the jobsite at all times. All changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. The as-built marked prints will be jointly reviewed for accuracy and completeness by the Contracting Officer and a responsible representative of the construction Contractor prior to submission of each monthly pay estimate. If the Contractor fails to maintain the as-built drawings as specified herein, the Contracting Officer will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the as-built drawings and will continue the monthly deduction of the 10% retainage even after 50% completion of the contract. This monthly deduction will continue until an agreement can be reached between the Contracting Officer and a representative of the Contractor regarding the accuracy and completeness of updated drawings. The prints shall show the following information, but not be limited thereto:

1.2.1 Location and Description

The location and description of any utility lines or other installations of any kind or description known to exist within the construction area. The location includes dimensions to permanent features.

1.2.2 Location and Dimensions

The location and dimensions of any changes within the building or structure.

1.2.3 Corrections

Correct grade, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

Correct elevations if changes were made in site grading.

1.2.4 Changes

Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

The topography, invert elevations and grades of all drainage installed or affected as a part of the project construction.

All changes or modifications which result from the final inspection.

1.2.5 Options

Where contract drawings or specifications present options, only the option selected for construction shall be shown on the as-built prints.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-11 Closeout Submittals

Progress Prints; G AR.

Preparation of two copies of as-builts from the Contractor to the Contracting Officer for review and approval.

Final Requirements; G AR.

CADD Files.

Shall consist of two sets of completed as-built contract drawings on separate media consisting of both CADD files (compatible with the Using Agency/Sponsor's system on electronic storage media identical to that supplied by the Government) and a CALS Type 1, Group 4, Raster Image File of each contract drawing.

Receipt by the Contractor of the approved marked as-built prints.

1.4 PRELIMINARY SUBMITTAL

At the time of final inspection, the Contractor shall prepare two copies of the progress as-built prints and these shall be delivered to the Contracting Officer for review and approval. These as-built marked prints shall be neat, legible and accurate. The review by Government personnel

will be expedited to the maximum extent possible. Upon approval, one copy of the as-built marked prints will be returned to the Contractor for use in preparation of final as-built drawings. If upon review, the as-built marked prints are found to contain errors and/or omissions, they shall be returned to the Contractor for corrections. The Contractor shall complete the corrections and return the as-built marked prints to the Contracting Officer within ten (10) calendar days.

1.5 DRAWING PREPARATION

1.5.1 As-Built Drawings Approval

Upon approval of the as-built prints submitted, the Contractor will be furnished by the Government one set of contract drawings, with all amendments incorporated, to be used for as-built drawings. These contract drawings will be furnished on CD-ROM. These drawings shall be modified as may be necessary to correctly show all the features of the project as it has been constructed by bringing the contract set into agreement with the approved as-built prints, adding such additional drawings as may be necessary. These drawings are part of the permanent records of this project and the Contractor shall be responsible for the protection and safety thereof until returned to the Contracting Officer. Any drawings damaged or lost by the Contractor shall be satisfactorily replaced by the Contractor at no expense to the Government.

1.5.2 Proficient Personnel

Only personnel proficient in the preparation of engineering CADD drawings to standards satisfactory and acceptable to the Government shall be employed to modify the contract drawings or prepare additional new drawings. All additions and corrections to the contract drawings shall be equal in quality to that of the originals. Line work, line weights, lettering, layering conventions, and symbols shall be the same as the original line work, line weights, lettering, layering conventions, and symbols. If additional drawings are required, they shall be prepared using the specified electronic file format applying the same guidance specified for original drawings. The title block and drawing border to be used for any new as-built drawings shall be identical to that used on the contract drawings. All additions and corrections to the contract drawings shall be accomplished using CADD media files supplied by the Government. These contract drawings will already be compatible with the Using Agency/Sponsor's system when received by the Contractor. The Using Agency/Sponsor uses AutoCAD Release 2000 CADD software system. The media files will be supplied on ISO 9660 Format CD-ROM. The Contractor is responsible for providing all program files and hardware necessary to prepare as-built drawings. The Contracting Officer will review all as-built drawings for accuracy and the Contractor shall make all required corrections, changes, additions, and deletions.

1.5.3 Final Revisions

When final revisions have been completed, the cover sheet drawing shall show the wording "RECORD DRAWING AS-BUILT" followed by the name of the

General Contractor in letters at least 3/16 inch high. All other contract drawings shall be marked either "As-Built" drawing denoting no revisions on the sheet or "Revised As-Built" denoting one or more revisions. All original contract drawings shall be dated in the revision block (SEE ATTACHMENTS 1 and 2) located at the end of this section. (SEE ATTACHMENTS 1 and 2 (at the end of this section) - while the title block sample attachments do not depict the contract drawings' title blocks, the sample revision blocks above these attachments are to be used as guidance in completing the actual contract drawings' revision blocks).

1.6 FINAL REQUIREMENTS

After receipt by the Contractor of the approved marked as-built prints and the original contract drawing files the Contractor will, within 30 days for contracts less than \$5 million or 60 days for contracts \$5 million and above, make the final as-built submittal. The submittal shall consist of the following:

a) Two sets of the as-built contract drawings on separate CD's (ISO 9660 Format CD-ROM) consisting of the updated CADD files and a CALS Type 1 Group 4 Raster Image File of each contract drawing plate. The CALS files shall be exact duplicates of the full sized plots of the completed as-built contract drawings at a resolution of 400 dpi and may be either plotted to CALS files directly from the CADD files, or scanned to file from the prints.

b) Two sets of full size paper prints (plots) of the completed as-built contract drawings.

c) The return of the approved marked as-built prints.

They shall be complete in all details and identical in form and function to the contract drawing files supplied by the Government. Any translations or adjustments necessary to accomplish this is the responsibility of the Contractor. The Government reserves the right to reject any drawing files it deems incompatible with its CADD system. All paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit as-built drawing files and marked prints as required herein shall be cause for withholding any payment due the Contractor under this contract. Approval and acceptance of final as-built drawings shall be accomplished before final payment is made to the Contractor.

1.7 PAYMENT

No separate payment will be made for the as-built drawings required under this contract, and all costs in connection therewith shall be considered a subsidiary obligation of the Contractor.

PART 2 PRODUCT
NOT APPLICABLE

PART 3 EXECUTION
NOT APPLICABLE

-- End of Section --

SECTION 02510

WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN RAILWAY ENGINEERING & MAINTENANCE-OF-WAY ASSOCIATION
(AREMA)

AREMA Manual (1999) Manual for Railway Engineering (4
Vol.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1997a) Carbon Structural Steel
ASTM A 53	(1999b) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM B 88	(1996) Seamless Copper Water Tube
ASTM C 76	(1999) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM D 1599	(1999) Resistance to Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings
ASTM D 1784	(1999a) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 1785	(1999) Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	(1996b) Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2464	(1999) Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2466	(1999) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40

Fire Station Expansion and Renovation
Fort Detrick, Maryland

ASTM D 2467	(1999) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2564	(1996a) Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2657	(1997) Heat Fusion Joining Polyolefin Pipe and Fittings
ASTM D 2774	(1994) Underground Installation of Thermoplastic Pressure Piping
ASTM D 2855	(1996) Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 2996	(1995) Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe
ASTM D 2997	(1995) Centrifugally Cast "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe
ASTM D 3139	(1998) Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM D 3839	(1994a) Underground Installation of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe
ASTM D 4161	(1996) "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe Joints Using Elastomeric Seals
ASTM F 477	(1999) Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 1483	(1998) Oriented Poly(Vinyl Chloride), PVC0, Pressure Pipe

ASME INTERNATIONAL (ASME)

ASME B1.20.1	(1983; R 1992) Pipe Threads, General Purpose (Inch)
ASME B16.1	(1998) Cast Iron Pipe Flanges and Flanged Fittings
ASME B16.3	(1992) Malleable Iron Threaded Fittings
ASME B16.26	(1988) Cast Copper Alloy Fittings for Flared Copper Tubes

Fire Station Expansion and Renovation
Fort Detrick, Maryland

ASME B36.10M (1996) Welded and Seamless Wrought Steel
Pipe

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA B300	(1992) Hypochlorites
AWWA B301	(1992) Liquid Chlorine
AWWA C104	(1995) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C110	(1993) Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (75 mm through 1200 mm), for Water and Other Liquids
AWWA C111	(1995) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115	(1996) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C151	(1996) Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids
AWWA C153	(1994; Errata Nov 1996) Ductile-Iron Compact Fittings, 3 In. Through 24 In. (76 mm through 610 mm) and 54 In. through 64 In. (1,400 mm through 1,600 mm) for Water Service
AWWA C200	(1997) Steel Water Pipe - 6 In. (150 mm) and Larger
AWWA C203	(1997) Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot-Applied
AWWA C205	(1995) Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. (100 mm) and Larger - Shop Applied
AWWA C207	(1994) Steel Pipe Flanges for Waterworks Service - Sizes 4 In. Through 144 In. (100 mm through 3,600 mm)
AWWA C208	(1996) Dimensions for Fabricated Steel Water Pipe Fittings
AWWA C300	(1997) Reinforced Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids

Fire Station Expansion and Renovation
Fort Detrick, Maryland

AWWA C301	(1992) Prestressed Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids
AWWA C303	(1995) Concrete Pressure Pipe, Bar-Wrapped, Steel Cylinder Type
AWWA C500	(1993; C500a) Metal-Sealed Gate Valves for Water Supply Service
AWWA C502	(1994; C502a) Dry-Barrel Fire Hydrants
AWWA C503	(1997) Wet-Barrel Fire Hydrants
AWWA C504	(1994) Rubber-Seated Butterfly Valves
AWWA C509	(1994; Addendum 1995) Resilient-Seated Gate Valves for Water Supply Service
AWWA C600	(1993) Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C606	(1997) Grooved and Shouldered Joints
AWWA C651	(1992) Disinfecting Water Mains
AWWA C700	(1995) Cold-Water Meters - Displacement Type, Bronze Main Case
AWWA C701	(1988) Cold-Water Meters - Turbine Type, for Customer Service
AWWA C702	(1992) Cold-Water Meters - Compound Type
AWWA C703	(1996) Cold-Water Meters - Fire Service Type
AWWA C704	(1992) Propeller-Type Meters Waterworks Applications
AWWA C706	(1996) Direct-Reading, Remote-Registration Systems for Cold-Water Meters
AWWA C707	(1982; R 1992) Encoder-Type Remote-Registration Systems for Cold-Water Meters
AWWA C800	(1989) Underground Service Line Valves and Fittings
AWWA C900	(1997; C900a) Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Distribution

Fire Station Expansion and Renovation
Fort Detrick, Maryland

AWWA C901	(1996) Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. Through 3 In., for Water Service
AWWA C905	(1997) Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14 In. Through 36 In.
AWWA C909	(1998) Molecularly Oriented Polyvinyl Chloride (PVC) Pressure Pipe, 4 IN through 12 IN (100 mm through 300 mm), for Water Distribution
AWWA C950	(1995) Fiberglass Pressure Pipe
AWWA M23	(1980) Manual: PVC Pipe - Design and Installation

ASBESTOS CEMENT PIPE PRODUCERS ASSOCIATION (ACPPA)

ACPPA Work Practices	(1988) Recommended Work Practices for A/C Pipe
----------------------	--

DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA)

DIPRA-Restraint Design	(1997) Thrust Restraint Design for Ductile Iron Pipe
------------------------	--

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-80	(1997) Bronze Gate, Globe, Angle and Check Valves
-----------	---

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	(1995) Installation of Private Fire Service Mains and Their Appurtenances
NFPA 49	(1994) Hazardous Chemicals Data
NFPA 325-1	(1994) Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids
NFPA 704	(1996) Identification of the Fire Hazards of Materials for Emergency Response
NFPA 1961	(1997) Fire Hose

NSF INTERNATIONAL (NSF)

NSF 14	(1998) Plastics Piping Components and Related Materials
--------	---

NSF 61 (1999) Drinking Water System Components -
Health Effects (Sections 1-9)

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 21 (1991) White or Colored Silicone Alkyd
Paint

SSPC Paint 25 (1991) Red Iron Oxide, Zinc Oxide, Raw
Linseed Oil and Alkyd Primer (Without Lead
and Chromate Pigments)

1.2 PIPING

This section covers water [supply] [distribution] [service] lines, and connections to building service at a point approximately 5 feet outside buildings and structures to which service is required. The Contractor shall have a copy of the manufacturer's recommendations for each material or procedure to be utilized available at the construction site at all times.

1.2.1 Service Lines

Piping for water service lines less than 3 inches in diameter shall be galvanized steel, polyvinyl chloride (PVC) plastic, Oriented PVC plastic polyethylene, or copper tubing, unless otherwise shown or specified. Piping for water service lines 3 inches and larger shall be ductile iron, polyvinyl chloride (PVC) plastic, filament-wound or centrifugally cast reinforced thermosetting resin, reinforced plastic mortar pressure pipe or steel, unless otherwise shown or specified.

1.2.2 Distribution Lines 80 mm (3 Inches) or Larger

Piping for water distribution lines 3 inches or larger shall be ductile iron, polyvinyl chloride (PVC) through 36 inch nominal diameter plastic, Oriented PVC plastic filament-wound or centrifugally cast reinforced thermosetting resin, reinforced plastic mortar pressure pipe, or reinforced concrete, unless otherwise shown or specified.

1.2.3 Supply Lines 80 mm (3 Inches) or Larger

Piping for water supply lines 3 inches or larger shall be ductile iron, polyvinyl chloride (PVC) plastic, through 36 inch nominal diameter, Oriented PVC plastic filament-wound reinforced or centrifugally cast reinforced thermosetting resin, reinforced plastic mortar pressure pipe, steel, or reinforced concrete, unless otherwise shown or specified.

1.2.4 Sprinkler Supply Lines

Piping for water lines supplying sprinkler systems for building fire protection shall conform to NFPA 24 from the point of connection with the water distribution system to the building 5 foot line.

1.2.5 Potable Water Lines

Piping and components of potable water systems which come in contact with the potable water shall conform to NSF 61.

1.2.6 Plastic Piping System

Plastic piping system components (PVC, polyethylene, thermosetting resin and reinforced plastic mortar pressure) intended for transportation of potable water shall comply with NSF 14 and be legibly marked with their symbol.

1.2.7 Excavation, Trenching, and Backfilling

Excavation, trenching, and backfilling shall be in accordance with the applicable provisions of Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, except as modified herein.

1.3 UNIT PRICES

Measurement and payment will be based on completed work performed in accordance with the drawings, specifications, and the contract payment schedules. Payment will not be made under this section for excavation, trenching, or backfilling. Payment for such work will be made under Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

1.3.1 Measurement

The length of water lines to be paid for will be determined by measuring along the centerlines of the various sizes of pipe furnished and installed.

Pipe will be measured from center of fitting to center of fitting, from center of water distribution line to end of service connection, and from center of water distribution line to center of hydrant. No deduction will be made for the space occupied by valves or fittings.

1.3.2 Payment

Payment will be made for water lines at the contract unit price per linear foot for the various types and sizes of water lines, and will be full compensation for all pipes, joints, specials, and fittings, complete in place. Payment for fire hydrants, gate valves, valve boxes, and standard valve manholes will be made at the respective contract unit price each for such items complete in place. Payment will include the furnishing of all testing, plant, labor, and material and incidentals necessary to complete the work, as specified and as shown.

1.4 MANUFACTURER'S REPRESENTATIVE

The Contractor shall have a manufacturer's field representative present at the jobsite during the installation and testing of PE, RTRP, and/or RPMP pipe to provide technical assistance and to verify that the materials are being installed in accordance with the manufacturer's prescribed procedures. When the representative feels that the Contractor is installing and testing the PE, RTRP, and/or RPMP pipe in a satisfactory manner, certification shall be written to note which individuals employed by the Contractor are capable of properly installing the pipe. The field

representative shall advise the Contractor of unsatisfactory conditions immediately when they occur. Such conditions include improper diameter of pipe ends, damaged interior liner, poorly prepared joints, improper curing of joints, moving pipe before joints are cured, bending pipe to follow abrupt changes in trench contours, leaving pipe ends open in trench overnight, not properly drying joints after rain storms, exceeding effective adhesive life, sharp objects in trench bed, backfill that could damage pipe, improper procedure for concrete encasement of pipe, omission of thrust blocks at changes in direction or any other condition which could have an adverse effect on the satisfactory completion and operation of the piping system.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Installation; [____], [____].

The manufacturer's recommendations for each material or procedure to be utilized.

Waste Water Disposal Method; [____], [____].

The method proposed for disposal of waste water from hydrostatic tests and disinfection, prior to performing hydrostatic tests.

Satisfactory Installation; [____], [____].

A statement signed by the principal officer of the contracting firm stating that the installation is satisfactory and in accordance with the contract drawings and specifications, and the manufacturer's prescribed procedures and techniques, upon completion of the project and before final acceptance.

SD-06 Test Reports

Bacteriological Disinfection; [____], [____].

Test results from commercial laboratory verifying disinfection.

SD-07 Certificates

Manufacturer's Representative; [____], [____].

The name and qualifications of the manufacturer's representative and written certification from the manufacturer that the representative is technically qualified in all phases of PE, RTRP, and/or RPMP pipe laying and jointing and experienced to supervise

the work and train the Contractor's field installers, prior to commencing installation.

Installation; [____], [____].

A statement signed by the manufacturer's field representative certifying that the Contractor's personnel are capable of properly installing the pipe on the project.

Meters; [____], [____].

Manufacturer's certificate stating that each meter furnished has been tested for accuracy of registration and compliance with the accuracy and capacity requirements of the appropriate AWWA standard.

1.6 HANDLING

Pipe and accessories shall be handled to ensure delivery to the trench in sound, undamaged condition, including no injury to the pipe coating or lining. If the coating or lining of any pipe or fitting is damaged, the repair shall be made by the Contractor in a satisfactory manner, at no additional cost to the Government. No other pipe or material shall be placed inside a pipe or fitting after the coating has been applied. Pipe shall be carried into position and not dragged. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Government. Rubber gaskets that are not to be installed immediately shall be stored in a cool and dark place.

1.6.1 Coated and Wrapped Steel Pipe

Coated and wrapped steel pipe shall be handled in conformance with AWWA C203.

1.6.2 Polyethylene (PE) Pipe Fittings and Accessories

PE pipe, fittings, and accessories shall be handled in conformance with AWWA C901.

1.6.3 Miscellaneous Plastic Pipe and Fittings

Polyvinyl Chloride (PVC), Reinforced Thermosetting Resin Pipe (RTRP), and Reinforced Plastic Mortar Pressure (RPMP) pipe and fittings shall be handled and stored in accordance with the manufacturer's recommendations. Storage facilities shall be classified and marked in accordance with NFPA 704, with classification as indicated in NFPA 49 and NFPA 325-1.

PART 2 PRODUCTS

2.1 PIPE

Pipe shall conform to the respective specifications and other requirements specified below.

2.1.1 Reinforced and Prestressed Concrete Pipe

Steel cylinder reinforced concrete pipe shall conform to AWWA C300, AWWA C301, or AWWA C303 and shall be designed to withstand a working pressure of not less than 150 psi unless otherwise shown or specified.

2.1.2 Plastic Pipe

2.1.2.1 PE Plastic Pipe

Pipe, tubing, and heat-fusion fittings shall conform to AWWA C901.

2.1.2.2 PVC Plastic Pipe

Pipe, couplings and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454B.

a. Pipe Less Than 4 inch Diameter:

(1) Screw-Joint: Pipe shall conform to dimensional requirements of ASTM D 1785 Schedule 80, with joints meeting requirements of 150 psi working pressure, 200 psi hydrostatic test pressure, unless otherwise shown or specified. Pipe couplings when used, shall be tested as required by ASTM D 2464.

(2) Elastomeric-Gasket Joint: Pipe shall conform to dimensional requirements of ASTM D 1785 Schedule 40, with joints meeting the requirements of 150 psi working pressure, 200 psi hydrostatic test pressure, unless otherwise shown or specified, or it may be pipe conforming to requirements of ASTM D 2241, elastomeric joint, with the following applications:

SDR	Maximum Working Pressure psi	Minimum Hydrostatic Pressure psi
26	100	133
21	120	160
17	150	200
13.5	200	266

(3) Solvent Cement Joint: Pipe shall conform to dimensional requirements of ASTM D 1785 or ASTM D 2241 with joints meeting the requirements of 150 psi working pressure and 200 psi hydrostatic test pressure.

b. Pipe 4 through 12 inch Diameter: Pipe, couplings and fittings shall conform to AWWA C900, Class 150, CIOD pipe dimensions,

elastomeric-gasket joint, unless otherwise shown or specified.

- c. Pipe 14 through 36 inch Diameter: Pipe shall conform to AWWA C905 unless otherwise shown or specified.

2.1.2.3 Oriented Polyvinyl Chloride (PVC) Plastic Pipe

Pipe, couplings, and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454-B. Pipe shall conform to AWWA C909, Class 150, and to ASTM F 1483 and shall have an outside diameter equal to cast iron outside diameter.

2.1.3 Reinforced Plastic Mortar Pressure (RPMP) Pipe

RPMP shall be produced by centrifugal casting and shall have an OD 12 to 48 inches equal to ductile-iron, with a 150 psi pressure rating and with a minimum pipe stiffness of 36 psi. RPMP shall be in accordance with AWWA C950.

2.1.4 Reinforced Thermosetting Resin Pipe (RTRP)

Pipe shall have a quick-burst strength greater than or equal to four times the normal working pressure of the pipe. The quick-burst strength test shall conform to the requirements of ASTM D 1599.

2.1.4.1 RTRP-I

RTRP-I shall conform to ASTM D 2996, except pipe shall have an outside diameter equal to cast iron outside diameter or standard weight steel pipe. The pipe shall be suitable for a normal working pressure of 150 psi at 73 degrees F. The inner surface of the pipe shall have a smooth uniform continuous resin-rich surface liner conforming to ASTM D 2996.

2.1.4.2 RTRP-II

RTRP-II shall conform to ASTM D 2997. Pipe shall have an outside diameter equal to standard weight steel pipe.

2.1.5 Ductile-Iron Pipe

Ductile-iron pipe shall conform to AWWA C151, working pressure not less than 150 psi, unless otherwise shown or specified. Pipe shall be cement-mortar lined in accordance with AWWA C104. Linings shall be standard. When installed underground, pipe shall be coated in accordance with Section 13110 CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE). Flanged ductile iron pipe with threaded flanges shall be in accordance with AWWA C115.

2.1.6 Steel Pipe

2.1.6.1 Pipe 80 mm (3 Inches) and Larger, Not Galvanized

Steel pipe, not galvanized, shall conform to AWWA C200 with dimensional requirements as given in ASME B36.10M for pipe 6 inches in diameter and

larger, and ASTM A 53 for smaller sizes. Pipe shall be welded or seamless with plain or shouldered and grooved ends in accordance with AWWA C606 for use with mechanical couplings or bell-and-spigot ends with rubber gaskets. Bell-and-spigot ends for sizes less than 6 inches diameter shall be as required by AWWA C200. The minimum wall thickness of the various sizes of pipe shall be as follows:

Pipe Sizes	Thickness
[_____]	[_____]

2.1.6.2 Galvanized Steel Pipe

Galvanized steel pipe shall conform to ASTM A 53, standard weight.

2.1.6.3 Protective Materials for Steel Pipe

Protective materials for steel pipe, except as otherwise specified, shall be mechanically applied in a factory or plant especially equipped for the purpose. The materials shall, unless otherwise indicated on the drawings, consist of [one of the following] [the following] for the indicated pipe material and size:

- a. Pipe and fittings less than 3 inches in diameter shall be thoroughly cleaned of foreign material by wire brushing and solvent cleaning, and then given 1 coat of coal-tar primer and 2 coats of coal-tar enamel conforming to AWWA C203; threaded ends of pipe and fittings shall be adequately protected prior to coating.
- b. Pipe 3 Inches or Larger, Not Galvanized:
 - (1) Cement-mortar coating and lining shall conform to and shall be applied in conformance with AWWA C205. Cement-mortar coating and linings shall not be used for pipe less than 4 inches in diameter.
 - (2) Coal-tar enamel lining, coating and wrapping shall conform to AWWA C203 for materials, method of application, tests and handling. Non-asbestos material shall be used for the outerwrap.
 - (3) Cement-mortar lining, in lieu of coal-tar enamel lining, may be used with coal-tar enamel coating and wrapping. Cement-mortar lining shall conform to and shall be applied in conformance with AWWA C205.

2.1.7 Copper Tubing

Copper tubing shall conform to ASTM B 88, Type K, annealed.

2.2 FITTINGS AND SPECIALS

2.2.1 Reinforced Concrete Pipe System

Fittings and specials required for closures, curves, bends, branches and

connections to valves, pipe, or structures shall be approved by the Contracting Officer and conform to the details furnished by the manufacturer and to AWWA C300, AWWA C301, or AWWA C303, as applicable.

2.2.2 PVC Pipe System

- a. For pipe less than 4 inch diameter, fittings for threaded pipe shall conform to requirements of ASTM D 2464, threaded to conform to the requirements of ASME B1.20.1 for use with Schedule 80 pipe and fittings; fittings for solvent cement jointing shall conform to ASTM D 2466 or ASTM D 2467; and fittings for elastomeric-gasket joint pipe shall be iron conforming to AWWA C110 or AWWA C111. Iron fittings and specials shall be cement-mortar lined (standard thickness) in accordance with AWWA C104.
- b. For pipe 4 inch diameter and larger, fittings and specials shall be iron, bell end in accordance with AWWA C110, 150 psi pressure rating unless otherwise shown or specified, except that profile of bell may have special dimensions as required by the pipe manufacturer; or fittings and specials may be of the same material as the pipe with elastomeric gaskets, all in conformance with AWWA C900. Iron fittings and specials shall be cement-mortar lined (standard thickness) in accordance with AWWA C104. Fittings shall be bell and spigot or plain end pipe, or as applicable. Ductile iron compact fittings shall be in accordance with AWWA C153.

2.2.3 RTRP and RPMP Pipe

Fittings and specials shall be compatible with the pipe supplied. Filament wound or molded fittings up to 6 inches shall conform to AWWA C950. Iron fittings shall be cement-mortar lined in accordance with AWWA C104 and shall conform to AWWA C110 and AWWA C111. Fittings shall be suitable for working and testing pressures specified for the pipe.

2.2.4 Ductile-Iron Pipe System

Fittings and specials shall be suitable for 150 psi pressure rating, unless otherwise specified. Fittings and specials for mechanical joint pipe shall conform to AWWA C110. Fittings and specials for use with push-on joint pipe shall conform to AWWA C110 and AWWA C111. Fittings and specials for grooved and shouldered end pipe shall conform to AWWA C606. Fittings and specials shall be cement-mortar lined (standard thickness) in accordance with AWWA C104. Ductile iron compact fittings shall conform to AWWA C153.

2.2.5 Steel Pipe System

2.2.5.1 Not Galvanized Steel Pipe

Fittings and specials shall be made of the same material as the pipe. Specials and fittings may be made of standard steel tube turns or segmentally welded sections, with ends to accommodate the type of couplings or joints specified for the pipe. Dimensions of steel pipe fittings shall be in accordance with AWWA C208. The thickness and pressure rating of pipe fittings and specials shall be not less than the thickness specified and

the pressure rating calculated for the pipe with which they are used. Protective materials for fittings and specials shall be as specified for the pipe. Specials and fittings that cannot be mechanically lined, coated, and wrapped shall be lined, coated, and wrapped by hand, using the same material used for the pipe with the same number of applications of each material, smoothly applied.

2.2.5.2 Galvanized Steel Piping

Steel fittings shall be galvanized. Screwed fittings shall conform to ASME B16.3. Flanged fittings shall conform to AWWA C207.

2.2.5.3 Dielectric Fittings

Dielectric fittings shall be installed between threaded ferrous and nonferrous metallic pipe, fittings and valves, except where corporation stops join mains. Dielectric fittings shall prevent metal-to-metal contact of dissimilar metallic piping elements and shall be suitable for the required working pressure.

2.2.6 Copper Tubing System

Fittings and specials shall be flared and conform to ASME B16.26.

2.3 JOINTS

2.3.1 Gaskets for Reinforced Concrete Pipe

Rubber-gasket joints shall be of the type using a bell-and-spigot joint design of steel. The gaskets shall conform to AWWA C300, AWWA C301, or AWWA C303, as applicable.

2.3.2 Plastic Pipe Jointing

2.3.2.1 PE Pipe

Joints for pipe fittings and couplings shall be strong tight joints as specified for PE in Paragraph INSTALLATION. Joints connecting pipe of differing materials shall be made in accordance with the manufacturer's recommendation, and as approved by the Contracting Officer.

2.3.2.2 PVC Pipe

Joints, fittings, and couplings shall be as specified for PVC pipe. Joints connecting pipe of differing materials shall be made in accordance with the manufacturer's recommendations, and as approved by the Contracting Officer.

2.3.2.3 PVCO Pipe

Joints shall conform to ASTM D 3139. Elastomeric gaskets shall conform to ASTM F 477.

2.3.3 RPMP Pipe

Joints shall be bell and spigot gasket coupling utilizing an elastomeric gasket in accordance with ASTM D 4161.

2.3.4 RTRP Pipe

2.3.4.1 RTRP-I, Grade 1 and 2

Joints shall be bell and spigot with elastomeric gasket, mechanical coupling with elastomeric gasket, threaded and bonded coupling, or tapered bell and spigot with compatible adhesive. All RTRP-I materials shall be products of a single manufacturer.

2.3.4.2 RTRP-II, Grade 1 and 2

Joints shall be the bell and spigot type with elastomeric gasket, bell and spigot with adhesive, butt-jointed with adhesive bonded reinforced overlay, mechanical, flanged, threaded or commercially available proprietary joints, provided they are capable of conveying water at the pressure and temperature of the pipe.

2.3.5 Ductile-Iron Pipe Jointing

- a. Mechanical joints shall be of the stuffing box type and shall conform to AWWA C111.
- b. Push-on joints shall conform to AWWA C111.
- c. Rubber gaskets and lubricants shall conform to the applicable requirements of AWWA C111.

2.3.6 Steel Pipe Jointing

2.3.6.1 Steel Pipe, Not Galvanized

- a. Mechanical couplings shall be as specified.
- b. Bell-and-spigot joints for use with rubber gaskets shall conform to AWWA C200, as appropriate for the type of pipe. Rubber gaskets shall conform to applicable requirements of AWWA C200.
- c. Flanges shall conform to AWWA C207, and shall be used only in above ground installation or where shown on the drawings, or when approved.

2.3.6.2 Mechanical Couplings

Mechanical couplings for steel pipe shall be the sleeve type, or when approved, the split-sleeve type and shall provide a tight flexible joint under all reasonable conditions, such as pipe movements caused by expansion, contraction, slight setting or shifting in the ground, minor variations in trench gradients, and traffic vibrations. Couplings shall be of strength not less than the adjoining pipeline.

2.3.7 Bonded Joints

[Where indicated] [For all ferrous pipe], a metallic bond shall be provided at each joint, including joints made with flexible couplings, caulking, or rubber gaskets, of ferrous metallic piping to effect continuous conductivity. The bond wire shall be Size 1/0 copper conductor suitable for direct burial shaped to stand clear of the joint. The bond shall be of the thermal weld type.

2.3.8 Isolation Joints

Isolation joints shall be installed between nonthreaded ferrous and nonferrous metallic pipe, fittings and valves. Isolation joints shall consist of a sandwich-type flange isolation gasket of the dielectric type, isolation washers, and isolation sleeves for flange bolts. Isolation gaskets shall be full faced with outside diameter equal to the flange outside diameter. Bolt isolation sleeves shall be full length. Units shall be of a shape to prevent metal-to-metal contact of dissimilar metallic piping elements.

- a. Sleeve-type couplings shall be used for joining plain end pipe sections. The two couplings shall consist of one steel middle ring, two steel followers, two gaskets, and the necessary steel bolts and nuts to compress the gaskets.
- b. Split-sleeve type couplings may be used in aboveground installations when approved in special situations and shall consist of gaskets and a housing in two or more sections with the necessary bolts and nuts.

2.3.9 Copper Tubing Jointing

Joints shall be compression-pattern flared and shall be made with the specified fittings.

2.4 VALVES

2.4.1 Check Valves

Check valves shall be designed for a minimum working pressure of 150 psi or as indicated. Valves shall have a clear waterway equal to the full nominal diameter of the valve. Valves shall open to permit flow when inlet pressure is greater than the discharge pressure, and shall close tightly to prevent return flow when discharge pressure exceeds inlet pressure. The size of the valve, working pressure, manufacturer's name, initials, or trademark shall be cast on the body of each valve. Valves 2 inches and larger shall be [outside lever and spring] [outside lever and weight] [_____] type.

- a. Valves 2 inches and smaller shall be all bronze designed for screwed fittings, and shall conform to MSS SP-80, Class 150, Types 3 and 4 as suitable for the application.
- b. Valves larger than 2 inches shall be iron body, bronze mounted, shall have flanged ends, and shall be the non-slam type. Flanges

shall be the Class 125 type conforming to ASME B16.1.

2.4.2 Gate Valves

Gate valves shall be designed for a working pressure of not less than 150 psi. Valve connections shall be as required for the piping in which they are installed. Valves shall have a clear waterway equal to the full nominal diameter of the valve, and shall be opened by turning counterclockwise. The operating nut or wheel shall have an arrow, cast in the metal, indicating the direction of opening.

- a. Valves smaller than 3 inches shall be all bronze and shall conform to MSS SP-80, Type 1, Class 150.
- b. Valves 3 inches and larger shall be iron body, bronze mounted, and shall conform to AWWA C500. Flanges shall not be buried. An approved pit shall be provided for all flanged connections.
- c. Resilient-Seated Gate Valves: For valves 3 to 12 inches in size, resilient-seated gate valves shall conform to AWWA C509.

2.4.3 Rubber-Seated Butterfly Valves

Rubber-seated butterfly valves shall conform to the performance requirements of AWWA C504. Wafer type valves conforming to the performance requirements of AWWA C504 in all respects, but not meeting laying length requirements will be acceptable if supplied and installed with a spacer providing the specified laying length. All tests required by AWWA C504 shall be met. Flanged-end valves shall be installed in an approved pit and provided with a union or sleeve-type coupling in the pit to permit removal.

Mechanical-end valves 3 through 10 inches in diameter may be direct burial if provided with a suitable valve box, means for manual operation, and an adjacent pipe joint to facilitate valve removal. Valve operators shall restrict closing to a rate requiring approximately 60 seconds, from fully open to fully closed.

2.4.4 Pressure Reducing Valves

Pressure reducing valves shall maintain a constant downstream pressure regardless of fluctuations in demand. Valves shall be suitable for [_____] psi operating pressure on the inlet side, with outlet pressure set for [_____] psi. The valves shall be of the hydraulically-operated, pilot controlled, globe or angle type, and may be actuated either by diaphragm or piston. The pilot control shall be the diaphragm-operated, adjustable, spring-loaded type, designed to permit flow when controlling pressure exceeds the spring setting. Ends shall be [threaded] [flanged]. Valve bodies shall be bronze, cast iron or cast steel with bronze trim. Valve stem shall be stainless steel. Valve discs and diaphragms shall be synthetic rubber. Valve seats shall be bronze. Pilot controls shall be bronze with stainless steel working parts.

2.4.5 Vacuum and Air Relief Valves

Vacuum and air relief valves shall be of the size shown and shall be of a

type that will release air and prevent the formation of a vacuum. The valves shall automatically release air when the lines are being filled with water and shall admit air into the line when water is being withdrawn in excess of the inflow. Valves shall be iron body with bronze trim and stainless steel float.

2.4.6 Indicator Post for Valves

Each valve shown on the drawings with the designation "P.I.V." shall be equipped with indicator post conforming to the requirements of NFPA 24. Operation shall be by a wrench which shall be attached to each post.

2.5 VALVE BOXES

Valve boxes shall be cast iron or concrete, except that concrete boxes may be installed only in locations not subjected to vehicular traffic. Cast-iron boxes shall be extension type with slide-type adjustment and with flared base. The minimum thickness of metal shall be 3/16 inch. Concrete boxes shall be the standard product of a manufacturer of precast concrete equipment. The word "WATER" shall be cast in the cover. The box length shall adapt, without full extension, to the depth of cover required over the pipe at the valve location.

2.6 VALVE PITS

Valve pits shall be constructed at locations indicated or as required above and in accordance with the details shown. Concrete shall have compressive strength of 3000 psi in accordance with Section 03300CAST-IN-PLACE STRUCTURAL CONCRETE.

2.7 FIRE HYDRANTS

Hydrants shall be [dry-barrel type conforming to AWWA C502 with valve opening at least 5 inches in diameter and designed so that the flange at the main valve seat can be removed with the main valve seat apparatus remaining intact, closed and reasonably tight against leakage and with a breakable valve rod coupling and breakable flange connections located no more than 8 inches above the ground grade] [wet-barrel type conforming to AWWA C503, with either an automatic breakoff check valve or an auxiliary gate valve on hydrant branch]. Hydrants shall have a 6 inch bell connection, two 2-1/2 inch hose connections and one 4-1/2 inch pumper connection. Outlets shall have American National Standard fire-hose coupling threads. Working parts shall be bronze. Design, material, and workmanship shall be equal to the latest stock pattern ordinarily produced by the manufacturer. Hydrants shall be painted with 1 coat of red iron oxide, zinc oxide primer conforming to SSPC Paint 25 and 2 finish coats of silicone alkyd paint conforming to SSPC Paint 21, [of the installation's standard colors or as directed by the Contracting Officer] [color in accordance with NFPA recommendations]. Suitable bronze adapter for [the 4-1/2 inch] [each] outlet, with caps, shall be furnished.

2.8 FIRE-HYDRANT HOSE HOUSES

Hose houses conforming to the requirements of NFPA 24 shall be furnished at

each fire hydrant indicated on the drawings to have a fire-hydrant hose house. The following equipment, in addition to that listed in NFPA 24, paragraph 5-6.1, shall be furnished with each hose house:

- a. 200 feet of 2-1/2 inch, woven jacketed, rubber lined hose conforming to NFPA 1961 with a minimum service test pressure of 300 psi.
- b. 100 feet of 1-1/2 inch, woven jacketed, rubber lined hose conforming to NFPA 1961 with a minimum service test pressure of 300 psi.
- c. One gated 2-1/2 by 1-1/2 by 1-1/2 inch wye.
- d. One playpipe for 2-1/2 inch hose with 1 inch shutoff nozzle tip.
- e. One playpipe for 1-1/2 inch hose with 1/2 inch shutoff nozzle or combination nozzle.
- f. Two adapter fittings, 2-1/2 to 1-1/2 inch.
- g. Two spanners for 1-1/2 inch hose.

2.9 MISCELLANEOUS ITEMS

2.9.1 Service Clamps

Service clamps shall have a pressure rating not less than that of the pipe to be connected and shall be either the single or double flattened strap type. Clamps shall have a galvanized malleable-iron body with cadmium plated straps and nuts. Clamps shall have a rubber gasket cemented to the body.

2.9.2 Corporation Stops

Corporation stops shall have standard corporation stop thread conforming to AWWA C800 on the inlet end, with flanged joints, compression pattern flared tube couplings, or wiped joints for connections to goosenecks.

2.9.3 Goosenecks

Copper tubing for gooseneck connections shall conform to the applicable requirements of ASTM B 88, Type K, annealed. Length of cable requirement connections shall be in accordance with standard practice.

2.9.4 Service Stops

Service stops shall be water-works inverted-ground-key type, oval or round flow way, tee handle, without drain. Pipe connections shall be suitable for the type of service pipe used. All parts shall be of bronze with female iron-pipe-size connections or compression-pattern flared tube couplings, and shall be designed for a hydrostatic test pressure not less than 200 psi.

2.9.5 Tapping Sleeves

Tapping sleeves of the sizes indicated for connection to existing main shall be the cast gray, ductile, or malleable iron, split-sleeve type with flanged or grooved outlet, and with bolts, follower rings and gaskets on each end of the sleeve. Construction shall be suitable for a maximum working pressure of [150] [_____] psi. Bolts shall have square heads and hexagonal nuts. Longitudinal gaskets and mechanical joints with gaskets shall be as recommended by the manufacturer of the sleeve. When using grooved mechanical tee, it shall consist of an upper housing with full locating collar for rigid positioning which engages a machine-cut hole in pipe, encasing an elastomeric gasket which conforms to the pipe outside diameter around the hole and a lower housing with positioning lugs, secured together during assembly by nuts and bolts as specified, pretorqued to 50 foot-pound.

2.9.6 Service Boxes

Service boxes shall be cast iron or concrete and shall be extension service boxes of the length required for the depth of the line, with either screw or slide-type adjustment. The boxes shall have housings of sufficient size to completely cover the service stop or valve and shall be complete with identifying covers.

2.9.7 Disinfection

Chlorinating materials shall conform to the following:

Chlorine, Liquid: AWWA B301.

Hypochlorite, Calcium and Sodium: AWWA B300.

2.9.8 Meters

Meters shall be the type and size shown on the drawings or specified. Meters of each of the various types furnished and installed shall be supplied by one manufacturer.

2.9.8.1 Displacement Type

Displacement type meters shall conform to AWWA C700. Registers shall be straight-reading and shall read in [U.S. gallons] [cubic feet]. Meters in sizes 1/2 through 1 inch [shall] [shall not] be frost-protection design. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be [a direct reading remote register designed in accordance with AWWA C706] [or] [an encoder type remote register designed in accordance with AWWA C707]. Meters shall comply with the accuracy and capacity requirements of AWWA C700.

2.9.8.2 Turbine Type

Turbine type meters shall conform to AWWA C701 [Class I] [Class II]. The main casing shall be [bronze] [cast iron protected by corrosion resistant coating] with stainless steel external fasteners. Registers shall be

straight-reading type, shall be [permanently sealed] [open] and shall read in [U.S. gallons] [cubic feet]. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be [a direct reading remote register designed in accordance with AWWA C706] [or] [an encoder type remote register designed in accordance with AWWA C707]. Meters shall comply with the accuracy and capacity requirements of AWWA C701.

2.9.8.3 Compound Type

Compound type meters shall conform to AWWA C702 and [shall] [shall not] be furnished with strainers. The main casing shall be [bronze] [cast iron protected by corrosion resistant coating] with stainless steel external fasteners. The main casing shall be tapped for field testing purposes. Registers shall be straight-reading type, shall be [permanently sealed] [open] and shall read in [U.S. gallons] [cubic feet]. The meter [shall] [shall not] be equipped with a coordinating register. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be [a direct reading remote register designed in accordance with AWWA C706] [or] [an encoder type remote register designed in accordance with AWWA C707]. Meters shall comply with the accuracy and capacity requirements of AWWA C702.

2.9.8.4 Fire Service Type

Fire service type meters shall be [proportional type] [turbine type] conforming to AWWA C703 and [shall] [shall not] be furnished with strainers. The main casing shall be [bronze] [cast iron protected by corrosion resistant coating] with stainless steel external fasteners. Registers shall be straight-reading type, shall be [permanently sealed] [open] and shall read in [U.S. gallons] [cubic feet]. The meter [shall] [shall not] be equipped with a coordinating register. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be [a direct reading remote register designed in accordance with AWWA C706] [or] [an encoder type remote register designed in accordance with AWWA C707]. Meters shall comply with the accuracy and capacity requirements of AWWA C703. When turbine type main line meters are used, the meter shall be supplied with a separate check valve, as a unit.

2.9.8.5 Propeller Type

Propeller type meters shall conform to AWWA C704. Registers shall be straight-reading type, shall be [permanently sealed] [open] and shall read in [U.S. gallons] [cubic feet]. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be [a direct-reading remote register designed in accordance with AWWA C706] [or] [an encoder-type remote register designed in accordance with AWWA C707]. Meters shall comply with the accuracy and capacity requirements of AWWA C703.

2.9.9 Meter Boxes

Meter boxes shall be of cast iron, concrete, or plastic. The boxes shall be of sufficient size to completely enclose the meter and shutoff valve or service stop. Meter boxes set in paved areas subject to vehicular traffic shall be cast iron, or concrete with cast iron lid and cast iron meter

reader lid. Boxes set in sidewalks, not subject to vehicular traffic, [shall use concrete covers with cast iron meter reader lids] [shall be concrete with cast iron lid and cast iron meter reader lid]. Plastic boxes and lids [shall] [shall not] be used in unpaved areas or grass areas not subject to vehicular traffic. Box height shall extend from invert of the meter to final grade at the meter location. The lid shall have the word "WATER" cast in it.

2.10 METER VAULTS

Large meters shall be installed in reinforced concrete vaults in accordance with the details shown on the drawings.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Cutting of Pipe

Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe. Unless otherwise recommended by the manufacturer and authorized by the Contracting Officer, cutting shall be done with an approved type mechanical cutter. Wheel cutter shall be used when practicable. Copper tubing shall be cut square and all burrs shall be removed. Squeeze type mechanical cutters shall not be used for ductile iron.

3.1.2 Adjacent Facilities

3.1.2.1 Sewer Lines

Where the location of the water pipe is not clearly defined in dimensions on the drawings, the water pipe shall not be laid closer horizontally than 10 feet from a sewer except where the bottom of the water pipe will be at least 12 inches above the top of the sewer pipe, in which case the water pipe shall not be laid closer horizontally than 6 feet from the sewer. Where water lines cross under gravity-flow sewer lines, the sewer pipe, for a distance of at least 10 feet each side of the crossing, shall be fully encased in concrete or shall be made of pressure pipe with no joint located within 3 feet horizontally of the crossing. Water lines shall in all cases cross above sewage force mains or inverted siphons and shall be not less than 2 feet above the sewer main. Joints in the sewer main, closer horizontally than 3 feet to the crossing, shall be encased in concrete.

3.1.2.2 Water Lines

Water lines shall not be laid in the same trench with sewer lines, gas lines, fuel lines, or electric wiring.

3.1.2.3 Copper Tubing Lines

Copper tubing shall not be installed in the same trench with ferrous piping materials.

3.1.2.4 Nonferrous Metallic Pipe

Where nonferrous metallic pipe, e.g. copper tubing, crosses any ferrous piping material, a minimum vertical separation of 12 inches shall be maintained between pipes.

3.1.2.5 Casing Pipe

Water pipe shall be encased in a sleeve of rigid conduit for the lengths shown. Sleeves under railroads shall be in accordance with [the [_____] railroad company requirements] [the criteria contained in AREMA Manual, Part 5]. Where sleeves are required, in all other cases, the pipe sleeve shall be [steel, manufactured in accordance with AWWA C200, ASTM A 36/A 36M, [_____] , with a minimum wall thickness of [_____]] [reinforced concrete in accordance with and ASTM C 76, Class [V] [_____]] as specified for storm drains in Section 02630 STORM-DRAINAGE SYSTEM]. A minimum clearance of at least 2 inches between the inner wall of the sleeve and the maximum outside diameter of the sleeved pipe and joints shall be provided. Sand bedding or suitable pipe support shall be provided for the water pipe through the sleeve. Sleeves of ferrous material shall be provided with corrosion protection as required in Section [13110 CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE)] [_____] .

3.1.2.6 Structures

Where water pipe is required to be installed within 3 feet of existing structures, the water pipe shall be sleeved as required in Paragraph "Casing Pipe". The Contractor shall install the water pipe and sleeve ensuring that there will be no damage to the structures and no settlement or movement of foundations or footings.

3.1.3 Joint Deflection

3.1.3.1 Allowable for Reinforced Concrete Pipe

Maximum allowable deflections from a straight line or grade, as required by vertical curves, horizontal curves, or offsets, shall be 5 degrees for reinforced concrete pipe unless a lesser amount is recommended by the manufacturer. Long radius curves in reinforced concrete pipe shall be formed by straight pipe in which spigot rings are placed on a bevel. Slight deflections may be made by straight pipe, provided that the maximum joint opening caused by such deflection does not exceed the maximum recommended by the pipe manufacturer. Short radius curves and closures shall be formed by shorter lengths of pipe, bevels, or fabricated specials specified.

3.1.3.2 Offset for Flexible Plastic Pipe

Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturer and approved by the Contracting Officer, but shall not exceed 5 degrees.

3.1.3.3 Allowable for Ductile-Iron Pipe

The maximum allowable deflection shall be as given in AWWA C600. If the alignment requires deflection in excess of the above limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limit set forth.

3.1.3.4 Allowable for Steel Pipe

For pipe with bell-and-spigot rubber-gasket joints, maximum allowable deflections from a straight line or grade, as required by vertical curves, horizontal curves, or offsets shall be 5 degrees unless a lesser amount is recommended by the manufacturer. Short-radius curves and closures shall be formed by short lengths of pipe or fabricated specials specified.

3.1.3.5 Allowable for RPMP Pipe

For pipe with bell and spigot rubber gasket joints, maximum allowable deflections from a straight line or grade shall be 4 degrees determined by the diameter, unless a lesser amount is recommended by the manufacturer. Short-radius curves and closures shall be formed by short lengths of pipe or fabricated specials specified.

3.1.4 Placing and Laying

Pipe and accessories shall be carefully lowered into the trench by means of derrick, ropes, belt slings, or other authorized equipment. Water-line materials shall not be dropped or dumped into the trench. Abrasion of the pipe coating shall be avoided. Except where necessary in making connections with other lines or as authorized by the Contracting Officer, pipe shall be laid with the bells facing in the direction of laying. The full length of each section of pipe shall rest solidly upon the pipe bed, with recesses excavated to accommodate bells, couplings, and joints. Pipe that has the grade or joint disturbed after laying shall be taken up and relaid. Pipe shall not be laid in water or when trench conditions are unsuitable for the work. Water shall be kept out of the trench until joints are complete. When work is not in progress, open ends of pipe, fittings, and valves shall be securely closed so that no trench water, earth, or other substance will enter the pipes or fittings. Where any part of the coating or lining is damaged, the repair shall be made by and at the Contractor's expense in a satisfactory manner. Pipe ends left for future connections shall be valved, plugged, or capped, and anchored, as shown.

3.1.4.1 Reinforced Concrete Pipe Installation

Reinforced concrete pipe shall be installed in accordance with recommendations of the pipe manufacturer. Before laying reinforced concrete pipe, the outside surface of the spigot and the inside surface of the bell shall be cleaned and an acceptable vegetable-compound lubricant applied to the inside surface of the bell and to the rubber gasket. Where prescribed by the pipe manufacturer, the gasket shall be placed in the groove on the end of the pipe before the pipe is placed in the trench. After the pipe has been forced together, the position of the rubber gasket shall be checked with a feeler gauge in accordance with the pipe manufacturer's recommendations. Tapping of reinforced concrete cylinder pipe shall be done in accordance with the manufacturer's approved

recommendations. Where the manufacturer recommends that the taps be made by attaching the rubber-gasketed saddle to the outside of the pipe using U-bolts, the saddle shall be grouted in if necessary, the mortar coating shall be chipped away, even with the hole in the saddle plate. The exposed circumferential wires shall be removed and the cylinder and concrete core drilled out, and the steel saddle and U-bolts shall be protected by concrete encasement.

3.1.4.2 Plastic Pipe Installation

RTRP shall be installed in accordance with ASTM D 3839. RPMP shall be installed in accordance with the manufacturer's recommendations. PE Pipe shall be installed in accordance with ASTM D 2774. PVC pipe shall be installed in accordance with AWWA M23.

3.1.4.3 Piping Connections

Where connections are made between new work and existing mains, the connections shall be made by using specials and fittings to suit the actual conditions. When made under pressure, these connections shall be installed using standard methods as approved by the Contracting Officer. Connections to existing asbestos-cement pipe shall be made in accordance with ACPPA Work Practices.

3.1.4.4 Penetrations

Pipe passing through walls of valve pits and structures shall be provided with ductile-iron or Schedule 40 steel wall sleeves. Annular space between walls and sleeves shall be filled with rich cement mortar. Annular space between pipe and sleeves shall be filled with mastic.

3.1.4.5 Flanged Pipe

Flanged pipe shall only be installed above ground or with the flanges in valve pits.

3.1.5 Jointing

3.1.5.1 Reinforced Concrete Pipe Requirements

The inside and outside annular spaces between abutting sections of concrete pipe shall be filled with rich cement mortar in accordance with the pipe manufacturer's recommendations. Excess mortar shall be removed from interior annular spaces, leaving a smooth and continuous surface between pipe sections. Exposed portions of steel joint rings shall be protected from corrosion by a metallic coating or by an approved nonmetallic coating.

Rubber gaskets shall be handled, lubricated where necessary, and installed in accordance with the pipe manufacturer's recommendations.

3.1.5.2 PE Pipe Requirements

Jointing shall comply with ASTM D 2657, Technique I-Socket Fusion or Technique II-Butt Fusion.

3.1.5.3 PVC Plastic Pipe Requirements

- a. Pipe less than 4 inch diameter: Threaded joints shall be made by wrapping the male threads with approved thread tape or applying an approved lubricant, then threading the joining members together. The joint shall be tightened using strap wrenches to prevent damage to the pipe and/or fitting. To avoid excessive torque, joints shall be tightened no more than one thread past hand-tight. Preformed rubber-ring gaskets for elastomeric-gasket joints shall be made in accordance with ASTM F 477 and as specified. Pipe ends for push-on joints shall be beveled to facilitate assembly and marked to indicate when the pipe is fully seated. The gasket shall be prelubricated to prevent displacement. The gasket and ring groove in the bell or coupling shall match. The manufacturer of the pipe or fitting shall supply the elastomeric gasket. Couplings shall be provided with stops or centering rings to assure that the coupling is centered on the joint. Solvent cement joints shall use sockets conforming to ASTM D 2467. The solvent cement used shall meet the requirements of ASTM D 2564; the joint assembly shall be made in accordance with ASTM D 2855 and the manufacturer's specific recommendations.
- b. Pipe 4 through 12 inch diameter: Joints shall be elastomeric gasket as specified in AWWA C900. Jointing procedure shall be as specified for pipe less than 4 inch diameter with configuration using elastomeric ring gasket.
- c. Pipe 14 through 36 inch diameter: Joints shall be elastomeric gasket push-on joints made in accordance with AWWA M23.

3.1.5.4 RTRP I, RTRP II and RPMP Pipe

- a. RTRP I: Assembly of the pipe shall be done in conformance with the manufacturer's written instruction and installation procedures. Field joints shall be prepared as specified by the pipe manufacturer. Several pipe joints having interference-fit type couplings may be field bonded and cured simultaneously. However, the pipe shall not be moved and additional joints shall not be made until the previously laid joints are completely cured. Joints not having interference-fit type coupling shall be fitted with a clamp which shall hold the joint rigidly in place until the joint cement has completely cured. The clamps shall have a protective material on the inner surface to prevent damage to the plastic pipe when the clamp is tightened in place. The pipe manufacturer shall provide a device or method to determine when the joint is pulled against the pipe stop. Additionally, the pipe manufacturer shall furnish a gauge to measure the diameter of the spigot ends to ensure the diameter conforms to the tolerances specified by the manufacturer. All pipe ends shall be gauged. Factory certified tests shall have been satisfactorily performed to verify that short-term rupture strength is 1,500 psior greater when carried out in accordance with ASTM D 1599. At any ambient temperature, field bonded epoxy-cemented joints shall be cured with a self-regulating, thermostatically temperature controlled,

electrical heating blanket for the time and temperature recommended by the manufacturer for the applicable size and type of joint, or by an alternate heating method recommended by the manufacturer and approved by the Contracting Officer. The joint sections shall not be moved during heating, or until the joint has cooled to ambient temperature.

- b. RTRP II: A reinforced overlay joint shall be used to join sections together through a placement of layers of reinforcement fiberglass roving, mat, tape or fabric thoroughly saturated with compatible catalyzed resin.
- c. RPMP: Bell and spigot gasket-sealing coupling shall be used to connect pipes. The spigot shall be lubricated prior to push-together assembly.
- d. Fittings and Specials for RTRP and RPMP Pipe: Metal to RTRP and RPMP pipe connections shall be made by bolting steel flanges to RTRP and RPMP pipe flanges. Cast-iron fitting with gasket bell or mechanical joint may be used with RTRP if pipe has cast iron outside diameter. Steel flanges shall be flat-faced type. Where raised-face steel flanges are used, spacer rings shall be used to provide a flat-face seat for RTRP and RPMP pipe flanges. A full-face Buna "N" gasket 1/8 inch thick with a shore hardness of 50-60 shall be used between all flanged connections. The RTRP and RPMP pipe flange shall have raised sealing rings. Flat washers shall be used under all nuts and bolts on RTRP and RPMP pipe flanges. Bolts and nuts shall be of noncorrosive steel and torqued to not more than 100 foot pounds. Flanges shall not be buried. A concrete pit shall be provided for all flanged connections.

3.1.5.5 Ductile-Iron Pipe Requirements

Mechanical and push-on type joints shall be installed in accordance with AWWA C600 for buried lines or AWWA C606 for grooved and shouldered pipe above ground or in pits.

3.1.5.6 Not Galvanized Steel Pipe Requirements

- a. Mechanical Couplings: Mechanical couplings shall be installed in accordance with the recommendations of the couplings manufacturer.
- b. Rubber Gaskets: Rubber gaskets shall be handled, lubricated where necessary, and installed in accordance with the pipe manufacturer's recommendations.

3.1.5.7 Galvanized Steel Pipe Requirements

Screw joints shall be made tight with a stiff mixture of graphite and oil, inert filler and oil, or with an approved graphite compound, applied with a brush to the male threads only. Compounds shall not contain lead.

3.1.5.8 Copper Tubing Requirements

Joints shall be made with flared fittings. The flared end tube shall be pulled tightly against the tapered part of the fitting by a nut which is part of the fitting, so there is metal-to-metal contact.

3.1.5.9 Bonded Joints Requirements

Bonded joints shall be installed in accordance with details specified for joints in paragraph JOINTS.

3.1.5.10 Isolation Joints and Dielectric Fittings

Isolation joints and dielectric fittings shall be installed in accordance with details specified in paragraph JOINTS. Dielectric unions shall be encapsulated in a field-poured coal-tar covering, with at least 1/8 inch thickness of coal tar over all fitting surfaces.

3.1.5.11 Transition Fittings

Connections between different types of pipe and accessories shall be made with transition fittings approved by the Contracting Officer.

3.1.6 Installation of Service Lines

Service lines shall include the pipeline connecting building piping to water distribution lines to the connections with the building service at a point approximately 5 feet outside the building where such building service exists. Where building services are not installed, the Contractor shall terminate the service lines approximately 5 feet from the site of the proposed building at a point designated by the Contracting Officer. Such service lines shall be closed with plugs or caps. All service stops and valves shall be provided with service boxes. Service lines shall be constructed in accordance with the following requirements:

3.1.6.1 Service Lines 50 mm (2 Inches) and Smaller

Service lines 2 inches and smaller shall be connected to the main by a directly-tapped corporation stop or by a service clamp. A corporation stop and a copper gooseneck shall be provided with either type of connection. Maximum sizes for directly-tapped corporation stops and for outlets with service clamps shall be as in TABLE I. Where 2 or more gooseneck connections to the main are required for an individual service, such connections shall be made with standard branch connections. The total clear area of the branches shall be at least equal to the clear area of the service which they are to supply.

TABLE I. SIZE OF CORPORATION STOPS AND OUTLET

Pipe Size Inches	Corporation Stops, Inches For Ductile-Iron Pipe	Outlets w/Service Clamps, Inches Single & Double Strap
3	--	1

TABLE I. SIZE OF CORPORATION STOPS AND OUTLET

Pipe Size Inches	Corporation Stops, Inches For Ductile-Iron Pipe	Outlets w/Service Clamps, Inches Single & Double Strap
4	1	1
6	1-1/4	1-1/2
8	1-1/2	2
10	1-1/2	2
12 & larger	2	2

NOTE:

- a. Service lines 1-1/2 inches and smaller shall have a service stop.
- b. Service lines 2 inches in size shall have a gate valve.

3.1.6.2 Service Lines Larger than 50 mm (2 Inches)

Service lines larger than 2 inches shall be connected to the main by a tapped saddle, tapping sleeve and valve, service clamp or reducing tee, depending on the main diameter and the service line diameter, and shall have a gate valve. Lines 3 inches and larger may use rubber-seated butterfly valves as specified above, or gate valves.

3.1.6.3 Service Lines for Sprinkler Supplies

Water service lines used to supply building sprinkler systems for fire protection shall be connected to the water distribution main in accordance with NFPA 24.

3.1.7 Field Coating and Lining of Pipe

3.1.7.1 Steel Pipe 80 mm (3 In.) and Larger, Not Galvanized

- a. Cement-mortar coating and lining: Field jointing shall conform to Appendix, AWWA C205. Any defective area found in the coating and/or lining of pipe and joints shall be removed to the pipe wall and repaired. The repaired areas shall be at least equal in thickness to the minimum coating and/or lining required for the pipe. Steel reinforcement in the coating shall be repaired or replaced as necessary to assure a complete and soundly reinforced coating.
- b. Coal-tar enamel coating, lining and wrapping: Field jointing shall conform to AWWA C203. The applied materials shall be tested by means of a spark-type electrical inspection device in

accordance with the requirements of AWWA C203. Any flaws or holidays found in the coating and/or lining of pipe and joints shall be repaired by patching or other approved means. The repaired areas shall be at least equal in thickness to the minimum coating and/or lining required for the pipe.

3.1.7.2 Galvanized Steel Pipe, Field Coating

Field joints shall be given 1 coat of coal-tar primer and 2 coats of coal-tar enamel conforming to AWWA C203. The tests of the coating shall conform to AWWA C203, and any flaws or holidays found in the coating of pipe and joints shall be repaired by patching or other approved means; the repaired areas shall be at least equal in thickness to the minimum coating required for the pipe.

3.1.8 Setting of Fire Hydrants, Meters, Valves and Valve Boxes

3.1.8.1 Location of Fire Hydrants

Fire hydrants shall be located and installed as shown. Each hydrant shall be connected to the main with a 6 inch branch line having at least as much cover as the distribution main. Hydrants shall be set plumb with pumper nozzle facing the roadway, with the center of the lowest outlet not less than 18 inches above the finished surrounding grade, and the operating nut not more than 48 inches above the finished surrounding grade. Fire hydrants designated on the drawings as low profile shall have the lowest outlet not less than 18 inches above the finished surrounding grade, the top of the hydrant not more than 24 inches above the finished surrounding grade. Except where approved otherwise, the backfill around hydrants shall be thoroughly compacted to the finished grade immediately after installation to obtain beneficial use of the hydrant as soon as practicable. The hydrant shall be set upon a slab of concrete not less than 4 inches thick and 15 inchessquare. Not less than 7 cubic feet of free-draining broken stone or gravel shall be placed around and beneath the waste opening of dry barrel hydrants to ensure drainage.

3.1.8.2 Location of Meters

[Meters and meter boxes] [Vaults] shall be installed at the locations shown on the drawings. The meters shall be centered in the [boxes] [vaults] to allow for reading and ease of removal or maintenance.

3.1.8.3 Location of Valves

After delivery, valves, including those in hydrants, shall be drained to prevent freezing and shall have the interiors cleaned of all foreign matter before installation. Stuffing boxes shall be tightened and hydrants and valves shall be fully opened and fully closed to ensure that all parts are in working condition. Check, pressure reducing, vacuum, and air relief valves shall be installed in valve pits. Valves and valve boxes shall be installed where shown or specified, and shall be set plumb. Valve boxes shall be centered on the valves. Boxes shall be installed over each outside gate valve unless otherwise shown. Where feasible, valves shall be located outside the area of roads and streets. Earth fill shall be tamped

around each valve box or pit to a distance of 4 feet on all sides of the box, or the undisturbed trench face if less than 4 feet.

3.1.1.8.4 Location of Service Boxes

Where water lines are located below paved streets having curbs, the boxes shall be installed directly back of the curbs. Where no curbing exists, service boxes shall be installed in accessible locations, beyond the limits of street surfacing, walks and driveways.

3.1.1.9 Tapped Tees and Crosses

Tapped tees and crosses for future connections shall be installed where shown.

3.1.1.10 Thrust Restraint

Plugs, caps, tees and bends deflecting 11.25 degrees or more, either vertically or horizontally, on waterlines 4 inches in diameter or larger, and fire hydrants shall be provided with thrust restraints. Valves shall be securely anchored or shall be provided with thrust restraints to prevent movement. Thrust restraints shall be either thrust blocks or, for ductile-iron pipes, restrained joints.

3.1.10.1 Thrust Blocks

Thrust blocking shall be concrete of a mix not leaner than: 1 cement, 2-1/2 sand, 5 gravel; and having a compressive strength of not less than 2,000 psi after 28 days. Blocking shall be placed between solid ground and the hydrant or fitting to be anchored. Unless otherwise indicated or directed, the base and thrust bearing sides of thrust blocks shall be poured directly against undisturbed earth. The sides of thrust blocks not subject to thrust may be poured against forms. The area of bearing shall be as shown or as directed. Blocking shall be placed so that the fitting joints will be accessible for repair. Steel rods and clamps, protected by galvanizing or by coating with bituminous paint, shall be used to anchor vertical down bends into gravity thrust blocks.

3.1.10.2 Restrained Joints

For ductile-iron pipe, restrained joints shall be designed by the Contractor or the pipe manufacturer in accordance with DIPRA-Restraint Design.

3.2 HYDROSTATIC TESTS

Where any section of a water line is provided with concrete thrust blocking for fittings or hydrants, the hydrostatic tests shall not be made until at least 5 days after installation of the concrete thrust blocking, unless otherwise approved.

3.2.1 Pressure Test

After the pipe is laid, the joints completed, fire hydrants permanently

installed, and the trench partially backfilled leaving the joints exposed for examination, the newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for 1 hour to a hydrostatic pressure test of [200] [_____] psi. Water supply lines designated on the drawings shall be subjected for 1 hour to a hydrostatic pressure test of [200] [_____] psi. Each valve shall be opened and closed several times during the test. Exposed pipe, joints, fittings, hydrants, and valves shall be carefully examined during the partially open trench test. Joints showing visible leakage shall be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, hydrants and valves discovered in consequence of this pressure test shall be removed and replaced with sound material, and the test shall be repeated until the test results are satisfactory. The requirement for the joints to remain exposed for the hydrostatic tests may be waived by the Contracting Officer when one or more of the following conditions is encountered:

- a. Wet or unstable soil conditions in the trench.
- b. Compliance would require maintaining barricades and walkways around and across an open trench in a heavily used area that would require continuous surveillance to assure safe conditions.
- c. Maintaining the trench in an open condition would delay completion of the project.

The Contractor may request a waiver, setting forth in writing the reasons for the request and stating the alternative procedure proposed to comply with the required hydrostatic tests. Backfill placed prior to the tests shall be placed in accordance with the requirements of Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

3.2.2 Leakage Test

Leakage test shall be conducted after the pressure tests have been satisfactorily completed. The duration of each leakage test shall be at least 2 hours, and during the test the water line shall be subjected to not less than [200] [_____] psi pressure. Water supply lines designated on the drawings shall be subjected to a pressure equal to [200] [_____] psi. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved or approved section, necessary to maintain pressure within 5 psi of the specified leakage test pressure after the pipe has been filled with water and the air expelled. Piping installation will not be accepted if leakage exceeds the allowable leakage which is determined by the following formula:

$$L = 0.0001351ND(P \text{ raised to } 0.5 \text{ power})$$

L = Allowable leakage in gallons per hour

N = Number of joints in the length of pipeline tested

D = Nominal diameter of the pipe in inches

P = Average test pressure during the leakage test, in psi gauge

Should any test of pipe disclose leakage greater than that calculated by the above formula, the defective joints shall be located and repaired until

the leakage is within the specified allowance, without additional cost to the Government.

3.2.3 Time for Making Test

Except for joint material setting or where concrete thrust blocks necessitate a 5-day delay, pipelines jointed with rubber gaskets, mechanical or push-on joints, or couplings may be subjected to hydrostatic pressure, inspected, and tested for leakage at any time after partial completion of backfill. Cement-mortar lined pipe may be filled with water as recommended by the manufacturer before being subjected to the pressure test and subsequent leakage test.

3.2.4 Concurrent Hydrostatic Tests

The Contractor may elect to conduct the hydrostatic tests using either or both of the following procedures. Regardless of the sequence of tests employed, the results of pressure tests, leakage tests, and disinfection shall be as specified. Replacement, repair or retesting required shall be accomplished by the Contractor at no additional cost to the Government.

- a. Pressure test and leakage test may be conducted concurrently.
- b. Hydrostatic tests and disinfection may be conducted concurrently, using the water treated for disinfection to accomplish the hydrostatic tests. If water is lost when treated for disinfection and air is admitted to the unit being tested, or if any repair procedure results in contamination of the unit, disinfection shall be reaccomplished.

3.3 BACTERIALDISINFECTION

3.3.1 Bacteriological Disinfection

Before acceptance of potable water operation, each unit of completed waterline shall be disinfected [as prescribed by AWWA C651.] [as specified.

After pressure tests have been made, the unit to be disinfected shall be thoroughly flushed with water until all entrained dirt and mud have been removed before introducing the chlorinating material. The chlorinating material shall be either liquid chlorine, calcium hypochlorite, or sodium hypochlorite, conforming to paragraph MISCELLANEOUS ITEMS. The chlorinating material shall provide a dosage of not less than 50 ppm and shall be introduced into the water lines in an approved manner. Polyvinyl Chloride (PVC) pipe lines shall be chlorinated using only the above specified chlorinating material in solution. The agent shall not be introduced into the line in a dry solid state. The treated water shall be retained in the pipe long enough to destroy all non-spore forming bacteria.

Except where a shorter period is approved, the retention time shall be at least 24 hours and shall produce not less than 25 ppm of free chlorine residual throughout the line at the end of the retention period. Valves on the lines being disinfected shall be opened and closed several times during the contact period. The line shall then be flushed with clean water until the residual chlorine is reduced to less than 1.0 ppm. During the flushing period, each fire hydrant on the line shall be opened and closed several

times.] From several points in the unit, [the Contracting Officer will take samples of water in proper sterilized containers for bacterial examination.] [personnel from the Contractor's commercial laboratory shall take at least [3] [_____] water samples from different points, approved by the Contracting Officer, in proper sterilized containers and perform a bacterial examination in accordance with state approved methods. The commercial laboratory shall be certified by the state's approving authority for examination of potable water.] The disinfection shall be repeated until tests indicate the absence of pollution for at least 2 full days. The unit will not be accepted until satisfactory bacteriological results have been obtained.

3.4 CLEANUP

Upon completion of the installation of water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

-- End of Section --